



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**HOMELAND SECURITY AS A STOCK MARKET:
ANTIFRAGILITY AS A STRATEGY FOR HOMELAND
SECURITY**

by

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December 2013

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REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE December 2013	3. REPORT TYPE AND DATES COVERED Master's Thesis	
4. TITLE AND SUBTITLE HOMELAND SECURITY AS A STOCK MARKET: ANTIFRAGILITY AS A STRATEGY FOR HOMELAND SECURITY			5. FUNDING NUMBERS	
6. AUTHOR(S) John T. Egan				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB Protocol number ____N/A____.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE A	
13. ABSTRACT (maximum 200 words) <p>Since 2002, there have been varying definitions of homeland security. Disagreements about what homeland security is can cause misalignment with budgets and homeland security priorities. The objective of this thesis is to better understand homeland security through the lens of risk and uncertainty using a metaphorical approach comparing homeland security and financial markets. The usefulness of the financial market metaphor is it allows one to conceptualize homeland security as an investor's financial portfolio that is subject to market volatility, market sentiment and mood, investing costs, and market booms and busts.</p> <p>This metaphorical approach for understanding homeland security suggests a nontraditional risk-based antifragile strategy. More than being robust or resilient, which resist or absorb volatility, an antifragile strategy benefits from volatility, adapts, and becomes better. To make something antifragile, individuals and organizations should invest more time in identifying things or processes that are negative rather than focus on the positive. Removing things that are negative can uncover hidden options that can better prepare people or organizations for uncertainty and market volatility. This is a strategy that relies less on definitions of homeland security and is a bottom up, rather than a top down, approach to risk management.</p>				
14. SUBJECT TERMS Homeland Security, Risk, Uncertainty, Financial Markets, Stock Market, Behavioral Economics, Psychology, Prospect Theory, Complex Systems, Complexity, Biases, Perceptions, Antifragility, Antifragile, Black Swan, Bubble, Strategy			15. NUMBER OF PAGES 101	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU	

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ANTIFRAGILITY AS A STRATEGY FOR HOMELAND SECURITY**

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Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES
(HOMELAND SECURITY AND DEFENSE)**

from the

**NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

Since 2002, there have been varying definitions of homeland security. Disagreements about what homeland security is can cause misalignment with budgets and homeland security priorities. The objective of this thesis is to better understand homeland security through the lens of risk and uncertainty using a metaphorical approach comparing homeland security and financial markets. The usefulness of the financial market metaphor is it allows one to conceptualize homeland security as an investor's financial portfolio that is subject to market volatility, market sentiment and mood, investing costs, and market booms and busts.

This metaphorical approach for understanding homeland security suggests a nontraditional risk-based *antifragile* strategy. More than being robust or resilient, which resist or absorb volatility, an antifragile strategy benefits from volatility, adapts, and becomes better. To make something antifragile, individuals and organizations should invest more time in identifying things or processes that are negative rather than focus on the positive. Removing things that are negative can uncover hidden options that can better prepare people or organizations for uncertainty and market volatility. This is a strategy that relies less on definitions of homeland security and is a bottom up, rather than a top down, approach to risk management.

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EXECUTIVE SUMMARY

Homeland security has many evolving definitions, depending on when and whom you ask. Since 2002, there have been numerous strategic documents framing national and homeland security policy; many have varying definitions of homeland security. Disagreements about what homeland security is can cause misalignment with budgets and homeland security strategies.¹ While the meaning of homeland security continues to evolve, one way to understand homeland security is through the lens of risk and uncertainty.

The objective of this thesis is to observe how investors think and react to risk and uncertainty that is dynamic in order to seek an appropriate strategy for the homeland security domain. This thesis uses a lens of risk and uncertainty through a metaphorical approach that compares homeland security and financial markets. It uses the metaphor, *homeland security as a stock market*, to apply knowledge from financial markets to better understand analogous and sometimes irrational behavior of homeland security, especially as it relates to risk and uncertainty (see Figure 1).

The usefulness of the financial market metaphor is it allows one to conceptualize homeland security as an investor's financial portfolio that is subject to market volatility, market sentiment and mood, investing costs, and market bubbles and busts. What this teaches is financial and homeland security domains share the common denominator of individual and market behavior that is profoundly affected by psychological biases, especially when confronted by complex risk and uncertainty. This suggests exploring a nontraditional risk-based strategy of *antifragility*. More than being robust or resilient, which resist or absorb volatility and return to their normal states, strategies that are antifragile benefit from volatility, have more upside than downside, adapt and become better than they were.²

¹ Shawn Reese, *Defining Homeland Security: Analysis and Congressional Considerations*, CRS Report 42462 (Washington, DC: Library of Congress, Research Service, Jan 8, 2013).

² Nassim Taleb, *Antifragile: Things that Gain from Disorder* (New York: Random House, 2012), 301–335.



Figure 1. Thesis word cloud: Visually interpreting the major themes of this thesis and how they fit into the picture of homeland security.³

Studying the financial domain requires understanding how investors allocate limited assets over time under conditions of certainty and uncertainty. Similarly, studying the homeland security domain requires considering how Americans allocate limited resources on a rational or seemingly irrational prioritized risk basis to prevent or mitigate terrorist attacks within the United States. This requires reducing the vulnerability of the strategic components of American power, which includes the economy and its financial domain.⁴ Financial markets have huge implications for the solvency of the nation and the general condition of the economy. Protecting the security and confidence of others in the nation's economy and financial systems is one of the key objectives of the homeland security domain.⁵

³ Picture from Watch Dog Wire, <http://watchdogwire.wpengine.netdna-cdn.com/florida/files/2013/05/dhs-patch-630x286.jpg>. (Word cloud created at Tagxedo.com.)

⁴ James Kurth cites economic power as the essential base for military and ideological power. See "Pillars of the American Century," <http://www.the-american-interest.com/article.cfm?piece=688>; ADM Michael Mullen has in multiple venues cited the national debt as the most significant threat to national security. See <http://www.cnn.com/2010/US/08/27/debt.security.mullen/>.

⁵ U.S. Department of Homeland Security, "Secretary of Homeland Security Janet Napolitano's 2nd Annual Address on the State of America's Homeland Security: Homeland Security and Economic Security," Department of Homeland Security, Jan 30, 2012. <http://www.dhs.gov/news/2012/01/30/secretary-homeland-security-janet-napolitanos-2nd-annual-address-state-americas>.

To understand *homeland security as a stock market*, it is first important to understand how stock markets behave. In many instances, stock markets behave efficiently. In an efficient market, stock prices revolve around the continuous flow and interpretation of information where stock prices fully reflect all available information. Transactions in the market, seen as buying and selling, serve as a means of price discovery, where investors learn the value of whatever is being traded.⁶ As new information becomes available, the market quickly digests and adjusts prices accordingly.

Similarly, an efficient homeland security market implies that transactions between adversaries also serve as a means of price discovery. Advantages and exploitations from either an adversary perspective (i.e., threats), or from a government perspective (i.e., countermeasures) are short lived, as each entity acts on the available information in the environment. New threat intelligence is analyzed to determine the potential threats, vulnerabilities, and consequences. Countermeasures are employed to areas of greatest risk, while the political process engages regulations and international regimes to mitigate risk. As information is discovered in the homeland security market, the price or value of the exchange between threats and countermeasures increases or decreases (see Figure 2).

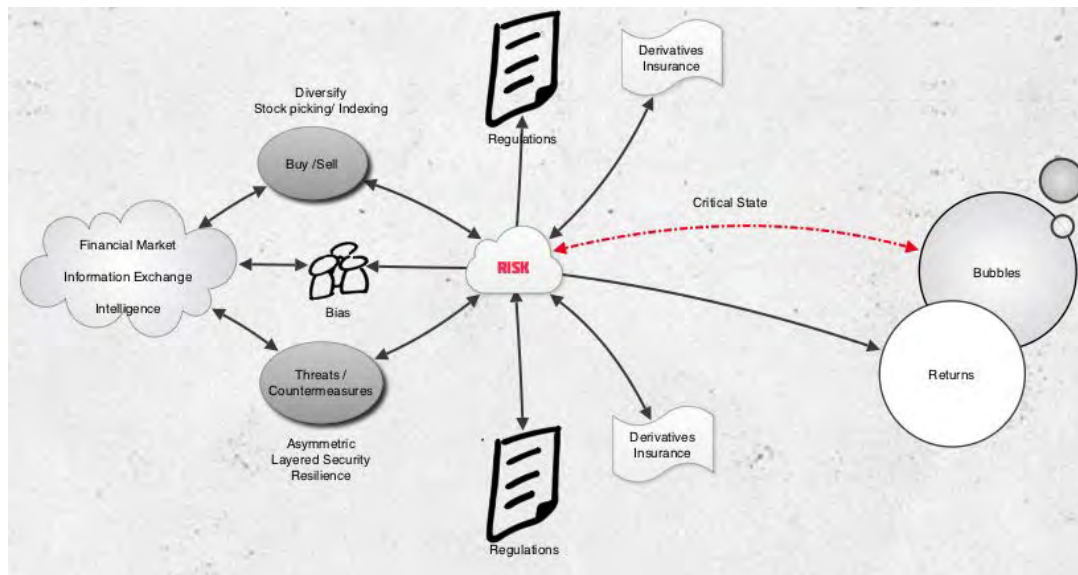


Figure 2. Homeland security as a stock market visual.

⁶ Robert Shiller, *Finance and the Good Society* (New York: Princeton University Press, 2012), 555, Kindle edition.

Alternatively, research from psychology and behavioral economics have shed new light on the nonefficient nature of financial markets. Biases, irrational behaviors, and feedback of the market participants themselves affect and are affected by valuation and the perception of risks. This helps to explain why many investors buy high and sell low, and why markets undergo bubbles and busts. Market complexity gives an idea of the inherent nature of things to move from a state of stability to instability, or from an efficient market to an inefficient one. This is the study of individual yet interconnected parts of a system that tend to move from a state of equilibrium to upheaval, as seen through bubbles, busts, and Black Swans.⁷

In a similar fashion, bubbles and inefficient markets can also be seen from a homeland security system perspective. Nowhere is this more apparent than with terrorism. Inadequate and inappropriate countermeasures can occur for numerous reasons, including but not limited to complacency, fiscal reductions, and not understanding and/or underestimating the dynamic and agile nature of threats. Similar to an investment portfolio that is not diversified, not having the necessary countermeasures in place increases risk in the homeland security system and can lead to a vacuum bubble of *under-protection*.

Yet perhaps even more common in a post-9/11 environment, though sometimes inconspicuous, is a bubble of *over-protection*. This can entail massive use of costly resources and restrictive regulations that can limit individual freedoms in exchange for a promise of safety. Likewise, public outrage from terrorism and its political dimensions can demand homeland security leadership to react and employ numerous and often costly antiterrorism activities, even if these actions cannot be proven effective.

This thesis cautions that in the current market, homeland security can easily fall victim to or may already be operating in a bubble of over-protection without sufficient regard to the cost-benefits. In financial markets, investment expenses and opportunity

⁷ Mark Buchanan, *Ubiquity: Why Catastrophes Happen* (New York: Three Rivers Press, 2001), 273; Ted Lewis, *Bak's Sand Pile* (Williams California: Agile Press, 2011), 46; Melanie Mitchell, *Complexity A Guided Tour* (New York: Oxford University Press, 2009), 335, Kindle edition.

costs from an overly conservative portfolio can have debilitating affects on returns. Akin to an overly conservative portfolio, homeland security may be operating in a bubble of over-protection, where the costs, both monetary and personal liberties, can be incommensurate with the expected end-states of safety and security.

Biases also play a major role in interfering with peoples' ability to interpret and understand our actual exposure and susceptibility to market volatility and Black Swan events.⁸ The events of 9/11, Hurricane Katrina, Super Storm Sandy, the Boston bombings, the near misses of Northwest Flight 253, and the bombing attempt on Times Square all represent varying levels of volatility. Events such as these can shock the homeland security market.

These events show that even with sound investing strategies, a homeland security portfolio is subject to the volatilities and uncertainty of the market. However, often time the potential for greatest opportunities emerge during times when fear and risk seem to dominate the conscience, as seen during the nadir of the recent financial crisis in 2009. What is important is how homeland security investors plan to respond to these events and seek long-term opportunity in the midst of crisis.

Adopting a broad framed, *antifragile* approach is key to dealing with and taking advantage of Black Swans, volatility, and uncertainty. Antifragility is a strategy for strategies. More than being robust or resilient, which resist or absorb volatility and return to their normal states, strategies that are antifragile benefit from volatility, have more upside than downside, adapt and become better than they were.⁹ An antifragile strategy incorporates *via negativa*, *optionality*, and *leveraging knowledge of biases*.¹⁰

To make something antifragile, individuals and organizations should invest more time in identifying those things and processes that do not work correctly rather than focus on improving or protecting what works. This is known as *via negativa*, or the negative way. What is known to be wrong is more robust to error than what we know is good.

⁸ D. Kahneman, *Thinking, Fast and Slow* (New York: Farrar, Straus and Giroux, 2011), 278–288.

⁹ Nassim Taleb, *Antifragile*.

¹⁰ Ibid.

Removing things that are negative can uncover hidden options that can better prepare people for uncertainty and market volatility. Options are a means that allow investors to asymmetrically deal with uncertainty by limiting downside losses and capitalizing on gains. Options also enable antifragility through seeking opportunity in volatility that is inherent in both the homeland and financial markets.¹¹

Examples of *via negativa* in homeland security might include DHS Congressional oversight reform and adjusting or eliminating activities whose costs are disproportionate to the expected gains. This includes combining or eliminating redundant agency activities, i.e., maritime security activities of Coast Guard and Customs and Border Protection's Office of Air and Marine. To address costs, DHS should mandate more cost-share policies that allocate security costs to those users who benefit the most, i.e., the 9/11 aviation security fee and reducing FEMA disaster assistance.

As evidence points to costs being disproportionate with the risks, this suggests that Congress and the Administration should seek to ways to gain broader consensus to reduce the cost of investing with DHS or seek a new investment manager all together. This *via negativa* approach may require outside innovation and realignment, bearing tough questions, such as: What does DHS look like without terrorism? Without terrorism—what justifies the Department and its costs to the freedoms of the very citizens it has been formed to protect? What costs are we willing to bear for a small reduction in risk that is already low? These and similar questions should seek to expose and ultimately remove elements of DHS which tend to fragilize things and create a need for ever more complexity to function.

Antifragility for homeland security is a nontraditional way of risk management that relies less on definitions by managing the security environment bottom up rather than top down—removing the small negative risks to reduce the overall systemic risk. Antifragility is not a stock picking methodology. It will not suggest what stocks to buy tomorrow or what homeland security countermeasures need to be employed. Rather, it is a strategy for strategies; it creates options to better prepare for and take advantage of

¹¹ Ibid.

future market volatility. To protect against a bubble or an irrational market, all levels of government should regularly question the market and experts by making bets against market sentiment and routinely revisit the level and understanding of risk and challenge assumptions. Homeland security practitioners should ask in their particular sphere of work or influence, “What does not work well? What negatively impacts my work in homeland security? How can I have an impact to change these things?” The answers to these questions will likely produce a homeland security strategy that is more impactful, less reliant on definitions, and more robust to error than many activities and strategies employed today. This is what it means to be antifragile in homeland security.

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ACKNOWLEDGMENTS

Developing this thesis has been a remarkable journey of expanding the boundaries of my learning. It has also been a challenging and often painful journey, both in an intellectual and time-management sense. However, journeys such as this one are rarely ever completed alone. I want to thank my dad, CAPT Mike Egan, USCG retired, for challenging me to think differently, lending a critical eye throughout this thesis process, and for encouraging me along the way. My mom, Margee Egan, applied her keen editorial skills, catching numerous mistakes that I had overlooked. Thank you for your help and time, mom. My co-workers Al and Mike provided detailed commentary and suggestions to make this a better thesis. I am grateful for you lending your time, expertise and help. My father-in-law, Dr. Erwin Wunderlich, edited and reviewed this thesis and made several critical suggestions and commentaries. Thank you, Erwin, for your encouragement, time, and effort to make this a stronger thesis. Lastly, thank you, Katie, for your help, encouragement, love, and patience to see *us* through this journey.

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I. INTRODUCTION

A. PROBLEM STATEMENT

Homeland security has many evolving definitions, depending on when and whom you ask. Since 2002, there have been numerous strategic documents framing national and homeland security policy; many have varying definitions of homeland security. Disagreements about what homeland security is can cause misalignment with budgets and homeland security priorities and strategies.¹² In Lewis Carroll's *Through the Looking Glass*, Humpty Dumpty could easily have been thinking of homeland security as he educated Alice on the meaning of words:

“When I use a word,” Humpty Dumpty said in a rather scornful voice, “it means just what I choose it to mean – neither more nor less!”

“The question is,” said Alice, “whether you can make words mean so many different things.”

“Not so,” said Humpty-Dumpty, “the question is which is to be the master. That’s all.”¹³



Figure 1. Alice meets Humpty Dumpty. Illustration by Tenniel from Carroll's *Through the Looking Glass*).

¹² Shawn Reese, *Defining Homeland Security: Analysis and Congressional Considerations*, CRS Report 42462 (Washington, DC: Library of Congress, Research Service, Jan 8, 2013).

¹³ Lewis Carroll, *Through the Looking Glass* (Amazon Digital Services, Sep 2011), 980. Kindle edition.

However, definitions do not always have to be applicable to all situations or have the same meaning to different individuals. In Carroll's *Alice in Wonderland*, the Duchess instructed Alice to "Take care of the sense and the sounds will take care of themselves."¹⁴ While the definition of homeland security has been a moving target and continues to evolve, one way to understand homeland security is through the lens of risk and uncertainty. In the *2010 Quadrennial Homeland Security Review*, the Department of Homeland Security (DHS) uses risk management in its approach to implementing homeland security, summarizing that "ultimately, homeland security is about effectively managing risks to the Nation's security."¹⁵

However, implementing effective risk management depends on how people perceive and understand risk and uncertainty. How governments, agencies, groups and individuals manage limited resources in an uncertain environment often depends upon these risk perceptions. The challenge is that risk and uncertainty are complicated variables that dramatically impact our decisions and behaviors.¹⁶ To gain insight about how people perceive risk and uncertainty in homeland security, it is useful to look across domains to more mature disciplines, particularly those inspired by risk and the profit it can deliver. Stock markets and financial markets are excellent arenas to explore how people interact and make decisions when surrounded risk and uncertainty.

The objective of this thesis is to observe how investors think and react to risk and uncertainty in order to seek an appropriate strategy for the homeland security domain. This thesis uses a lens of risk and uncertainty through a metaphorical approach that compares homeland security and financial markets. The usefulness of the financial market metaphor is it allows one to conceptualize homeland security as an investor's financial portfolio that is subject to market volatility, market sentiment and mood, investing costs, and market bubbles and busts. Stock market investors empirically test the

¹⁴ Lewis Carroll, *Alice's Adventures in Wonderland* (The Planet, Nov 2012), 97, Kindle edition.

¹⁵ Department of Homeland Security, *Risk Management Fundamentals: Homeland Security Risk Management Doctrine* (Department of Homeland Security, 2011), 7–8, <http://www.dhs.gov/xlibrary/assets/rma-risk-management-fundamentals.pdf>.

¹⁶ Paul Slovic et al., "Risk as Analysis and Risk as Feelings: Some Thoughts about Affect, Reason, Risk, and Rationality," *Risk Analysis: An International Journal* 24, no. 2 (April 2004): 311–322.

strategies that are antifragile benefit from volatility, have more upside than downside, adapt and become better than they were.¹⁹

First of all, it is important for the reader to understand what it means by the terms homeland security and financial market domains. Let us have Humpty Dumpty tell us exactly what studying the homeland security and financial domains means.

1. To Study the Financial Markets Domain

Studying the financial domain requires understanding how investors allocate limited assets over time under conditions of certainty and uncertainty by pricing assets based on their risk level, growth dynamics, and expected rate of return. Individual's behavior is the common denominator between what might be called the homeland security domain and the financial markets domain. On the one hand, financial markets have huge implications for the solvency of the nation and the general condition of the economy. On the other hand, protecting the security and confidence of others in the nation's economy and financial systems is one of the key objectives of the homeland security domain.²⁰

2. To Study the Homeland Security Domain

To study the homeland security domain is to consider how Americans allocate limited resources on a rational or seemingly irrational prioritized risk basis to prevent or mitigate terrorist attacks within the United States. This requires reducing the vulnerability of the strategic components of American power, which includes the economy and its

¹⁹ Nassim Taleb, *Antifragile: Things that Gain from Disorder* (New York: Random House, 2012), 301–335.

²⁰ U.S. Department of Homeland Security, “Secretary of Homeland Security Janet Napolitano’s 2nd Annual Address on the State of America’s Homeland Security: Homeland Security and Economic Security,” Department of Homeland Security, Jan 30, 2012. <http://www.dhs.gov/news/2012/01/30/secretary-homeland-security-janet-napolitanos-2nd-annual-address-state-americas>.

financial domain.²¹ President Obama expressed the significance of economic power as fundamental for American power; “At no time in human history has a nation of diminished economic vitality maintained its military and political primacy.”²² Additionally, homeland security has an important public safety component expressed in part by allocation of limited resources for consequence management of disasters whether man made by terrorism or caused by a natural phenomenon.

B. METHOD

The behaviors of financial markets can be difficult to understand, let alone be used to identify applicability to the behaviors of the homeland security domain. However, metaphors and analogies are central to thought and reasoning and can facilitate creative and imaginative ways to transfer knowledge from an existing domain to newer ones.²³

Lewis Carroll looked at social phenomenon “through a looking glass” using metaphors and analogies to analyze some of the social and political practices of his time. Using a looking glass of metaphors and analogies and sometimes-literal analysis (see Figures 3 and 4), this thesis examines the domains of financial markets and homeland security.

²¹ James Kurth cites economic power as the essential base for military and ideological power. See “Pillars of the American Century,” <http://www.the-american-interest.com/article.cfm?piece=688>; ADM Michael Mullen has in multiple venues cited the national debt as the most significant threat to national security.

²² Barack Obama, “Remarks by the President at the United States Military Academy at West Point Commencement,” May 22, 2010, <http://www.whitehouse.gov/the-press-office/remarks-president-united-states-military-academy-west-point-commencement>.

²³ George Lakoff, “The Contemporary Theory of Metaphor,” in *Metaphor and Thought: Second Edition*, ed. A. Ortony (Cambridge: Cambridge University Press, 1993), 202–251.

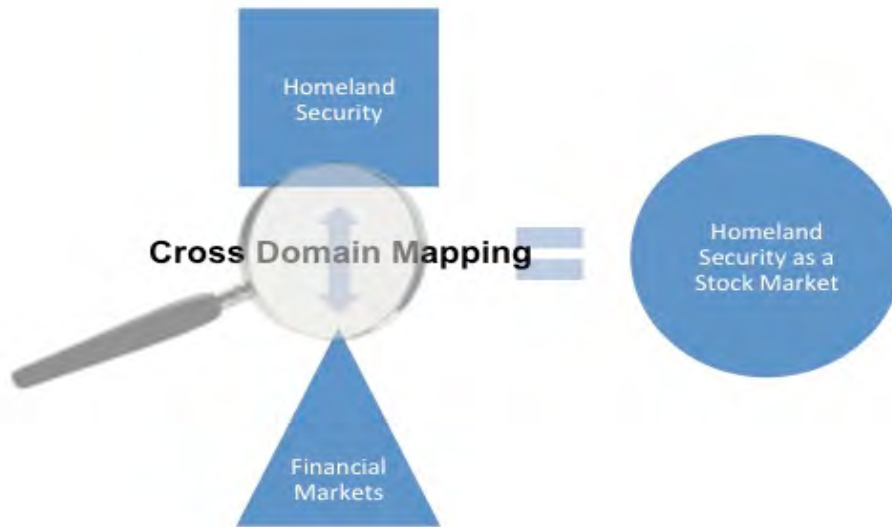


Figure 3. Metaphorical analysis: Cross domain mapping of homeland security and financial markets to form the conceptual metaphor “homeland security as a stock market.” Learning is in the conceptual or mental domain.

This thesis uses the conceptual metaphor, *homeland security as a stock market* in order to draw knowledge from financial markets to better understand analogous and sometimes irrational behavior of homeland security, especially as it relates to risk and uncertainty.²⁴ This thesis leverages Lakoff’s definition of a conceptual metaphor as a process of “cross-domain mapping in the conceptual system.”²⁵ Using the financial market metaphor acts as a means to explore and apply the concept of antifragility as a nontraditional risk management strategy for homeland security.

²⁴ For example, consider that a homeland security domain might act as an efficient market when intelligence permits one to balance threats with countermeasures. Intelligence that is not incorporated into the homeland security system enables the development of an inefficient market. Similar to financial markets, bubbles of under-protection and over-protection may develop in the homeland security system through discontinuous regulations, poor intelligence, complacency, funding anomalies, and irrational financial and political pressures.

²⁵ Lakoff, “The Contemporary Theory of Metaphor,” 202–251.



Figure 4. Literal analysis: Examining the overlay of homeland security and financial markets. Learning is by ‘seeing’ attributes, relationships, and similarities common to both domains.

The literature review discusses the advantages and limitations of using metaphor and analogies to integrate new information and ideas with prior knowledge. The literature review also examines research on risk and uncertainty to better understand their multiple dimensions, definitions, and nuances.

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II. LITERATURE REVIEW

The study of homeland security is an emerging discipline when compared to the extensive literature describing and analyzing economics and financial markets. Further, while there exists abundant writing on stock markets and financial theory, literature linking the similarities between financial markets and homeland security is lacking. Hence, metaphor and analogies can help to establish these links and generate new conceptual avenues for thoughts and ideas.

Some of the following literature review focuses on exploring existing literature on metaphors and analogies in order to create these links, reviewing their advantages and limitations. Other literature is used in the Analysis section in a point-by-point examination using analogies to build the conceptual metaphor of *homeland security as a stock market*. The review will also evaluate existing literature on risk and uncertainty, specifically, the multidimensional aspect of risk, and the many definitions of risk and uncertainty.

Because the terms metaphor and analogy are often used interchangeably, it is important to discuss their meaning and how they are used in this thesis.

A. METAPHOR AND ANALOGIES

Bratosin and Ionescu cite Aristotle as the “first to provide a systematical approach on the understanding of metaphor.”²⁶ According to Aristotle, “Metaphor is the application of a strange term either transferred from the genus and applied to the species or from the species and applied to the genus, or from one species to another, or else by analogy.”²⁷ Merriam-Webster defines metaphor as “a figure of speech in which one word or phrase literally denoting one kind of object or idea is used in place of another to

²⁶ Stefan Bratosin and Mihaela Ionescu, “Knowledge Dynamics - a Metaphorical Approach,” *Proceedings of the European Conference on Intellectual Capital* (Jan 2010): 121.

²⁷ Aristotle, *Poetics*, trans. S. H. Butcher (Amazon Digital Services, 2012), 417.

suggest a likeness or analogy between them.”²⁸ This definition alludes to the more commonly interpreted form of metaphor as a novel linguistic expression. Lakoff and Johnson state that “metaphor is for most people a device of the poetic imagination and the rhetorical flourish.”²⁹ They describe this linguistic interpretation of metaphor as the classic theory of metaphor; yet also argue that this is a “false” interpretation because generalizations governing “metaphorical expressions are not in language, but in thought.”³⁰

Lakoff highlights the fundamental use of metaphors for our thought and reasoning, explaining that “the locus of metaphor is not in language at all, but in the way we conceptualize one mental domain in terms of another.”³¹ Ricoeur, Gerhart and Russell concur, emphasizing the central role metaphors play in thinking, creativity, and finding new meaning.³²

However, Lakoff and Johnson also emphasize that metaphors are also tied to the conceptual nature of culture and experiences within that culture. They consider that some entailments of metaphor in one culture may be radically different from another.³³ Cook & Gordon suggest that “cultural and language differences...could make the use of metaphors problematic.”³⁴ This suggests that the utility of using financial markets as a metaphor for understanding homeland security, and thus risk and uncertainty, may be limited to one’s personal understanding and experiences of financial markets. That is to say that the value to one person using this approach may be very different than another based on their experience with the financial market domain.

²⁸ Merriam-Webster Online, s.v. “metaphor,” accessed 24 Nov 2013, <http://www.merriam-webster.com/dictionary/metaphor>.

²⁹ G. Lakoff and M. Johnson, *Metaphors We Live By* (London: University of Chicago Press, 1980), 3.

³⁰ Lakoff, *The Contemporary Theory of Metaphor*, 202.

³¹ Ibid.

³² See M. Gerhart and A. Russel, *Metaphoric Process: The Creation of Scientific and Religious Understanding* (Fort Worth: Texas Christian University Press, 1984), 133; P. Ricoeur, foreword to *Metaphoric Process: The Creation of Scientific and Religious Understanding* (Fort Worth: Texas Christian University Press, 1984).

³³ Lakoff and Johnson, *Metaphors We Live By*, 4.

³⁴ Stephen Cook and Frances Gordon, “Teaching Qualitative Research: A Metaphorical Approach,” *Journal of Advanced Nursing* 47, no. 6 (Sep 2004): 654.

Lakoff defines metaphor as a process of “cross-domain mapping in the conceptual system.”³⁵ More than just a linguistic expression, metaphor “can be understood as a mapping from a source domain to a target domain.”³⁶ A metaphor conceptualizes how we think about one domain in terms of another through this cross-domain mapping. Gerhart and Russell describe the making of a metaphor as a process which creates a “permanent distortion in our field of meanings...the metaphoric process is the primary sculptor of our thinking territory.”³⁷

Homeland security as a stock market is the conceptual metaphor used in this thesis, where the stock market has many characteristics and behaviors that are analogous to those found within the homeland security domain. Characteristics and behaviors of the two distinct domains are often not apparent until conceptually mapped, creating a new domain of meaning. Analogies are key to constructing this conceptual metaphor.³⁸

Unlike metaphors that conceptualize ideas or concepts across domains, analogies compare likeness, attributes, or relationships from one domain to another. Merriam Webster defines analogy as an “inference that if two or more things agree with one another in some respects they will probably agree in others.”³⁹ Wolfe expands this definition as “a figure of speech where one or more *relationships* among characteristics of a base are transferred to a target.”⁴⁰ Hofstadter and Sander argue that, “analogies lie at the very center of human cognition.” Analogies and concepts, they declare, play “the starring role, for without concepts there can be no thought, and without analogies there can be no concepts.”⁴¹

³⁵ Lakoff, *The Contemporary Theory of Metaphor*, 202.

³⁶ Ibid.

³⁷ Gerhart and Russel, *Metaphoric Process*, 133.

³⁸ Lakoff, *The Contemporary Theory of Metaphor*, 202–208.

³⁹ Merriam-Webster Online, s.v. “analogy,” accessed 24 Nov 2013, <http://www.merriam-webster.com/dictionary/analogy>.

⁴⁰ Christopher R. Wolfe, “Plant a Tree in Cyberspace: Metaphor and Analogy as Design Elements in Web-Based Learning Environments,” *CyberPsychology & Behavior* 4, no. 1 (Feb 2001): 68.

⁴¹ Douglas Hofstadter and Emmanuel Sander, *Surfaces and Essences: Analogy as the Fuel and Fire of Thinking* (New York: Basic, 2013), 592.

Linking analogies to metaphors, Bioy and Nègre describe the use of analogies as the basis of metaphorical construction.⁴² Steinhart argues, “analogies often provide conditions of meaningfulness and truth for metaphors.”⁴³ Synthesizing this with Lakoff’s cross-domain mapping, this thesis uses analogies to map the relationships and behaviors of homeland security and stock markets to build the metaphor *homeland security as a stock market*.

B. RISK AND UNCERTAINTY

To gain further insight into how people *think* about risk and uncertainty, one should consider the behaviors, actions, and decisions that others make as a result of their own understanding and perception of risk and uncertainty. How others perceive and define risk is what matters. This is important because as Paul Slovic explains, “our social and democratic institutions...breed distrust in the risk arena. Whoever controls the definition of risk controls the rational solution to the problem.”⁴⁴

Risk and uncertainty are sometimes confused and used synonymously. Addressing this, Cooper and Faseruk make clear distinctions between risk, “where probabilities are known- and uncertainty- where they are unknown.”⁴⁵ However, the distinction between certainty and uncertainty of probabilities can be often times be blurred, especially when risk probabilities prove to be drastically wrong.

Risk is often described as “the possibility of loss or injury.”⁴⁶ According to the DHS Risk Lexicon, risk is defined as “the potential for an unwanted outcome resulting from an incident, event, or occurrence, as determined by its likelihood and the associated

⁴² Antoine Bioy and Isabelle Nègre, “Analogy in Metaphors,” *European Journal of Clinical Hypnosis* 11, no. 1 (2011): 2–9.

⁴³ Eric Steinhart, “Analogical Truth Conditions for Metaphors,” *Metaphor & Symbolic Activity* 9, no. 3 (1994): 161.

⁴⁴ Paul Slovic, “Trust, Emotion, Sex, Politics, and Science: Surveying the Risk-Assessment Battlefield,” *Risk Analysis: An International Journal* 19, no. 4 (Aug 1999): 699.

⁴⁵ Tom Cooper and Alex Faseruk, “Strategic Risk, Risk Perception and Risk Behaviour: Meta-Analysis,” *Journal of Financial Management & Analysis* 24, no. 2 (Jul 2011): 21.

⁴⁶ Merriam-Webster Online, s.v. “risk,” accessed 24 Nov 2013, <http://www.merriam-webster.com/dictionary/risk>.

consequences.”⁴⁷ For risk analysis, DHS defines risk as the product of Threat x Vulnerability x Consequence.⁴⁸

Discussing risk in a financial context, Parker and Stewart show that different investment portfolios can have different levels of risk, though their net expected return is equal. They describe that the analysis of risky assets “requires consideration of all possible outcomes and assessment of the likelihood of the occurrence of each.”⁴⁹ Risk in this context refers to the variability of possible outcomes (usually measured as *beta* in finance). Variability can include historical as well as expected variability based on observed momentum and acceleration. This view lends the importance of time when considering risk as variability.⁵⁰

Some discussions of risk are centered on risk as a reality versus risk as a possibility (uncertainty). Rosa’s definition of risk, as described by Merkelsen, is “a situation or event where something of human value (including humans themselves) is at stake and where the *outcome* is uncertain.”⁵¹

Aven and Renn incorporate the dimension of uncertainty within the concept of risk. They suggest that uncertainty is in the mind of the beholder and that risk cannot be grounded on ontological grounds alone. Risk has two key concepts: consequences that are real and uncertainty that is “a construct of human imagination to cope with potential future outcomes that can become real.”⁵²

⁴⁷ Department of Homeland Security, *Risk Management Fundamentals*, 7–8.

⁴⁸ Todd Masse, Siobhan O’Neil and John Rollins, *The Department of Homeland Security’s Risk Assessment Methodology: Evolution, Issues, and Options for Congress*, CRS Report 33858 (Washington, D.C.: Library of Congress, Research Service, Feb 2, 2007). <http://fpc.state.gov/documents/organization/80208.pdf>.

⁴⁹ George Parker and Samuel Stewart Jr., “Risk and Investment Performance,” *Financial Analysts Journal* 30, no. 3 (May 1974): 49.

⁵⁰ Ibid.

⁵¹ Henrik Merkelsen, “The Constitutive Element of Probabilistic Agency in Risk: A Semantic Analysis of Risk, Danger, Chance, and Hazard,” *Journal of Risk Research* 14, no. 7 (Aug 2011): 881.

⁵² Terje Avena and Ortwin Renn, “On Risk Defined as an Event Where the Outcome is Uncertain,” *Journal of Risk Research* 12, no. 1 (2009): 8.

In real-life situations, quantifying uncertainty can be ambiguous, which can cause people to be “more averse to ambiguity [uncertainty] than to risk.”⁵³ This leads Roszkowski and Davey to discuss risk in terms of what is *not* known, rather than what is known, stating that, “People act on the basis of perceived rather than actual risk.”⁵⁴ Similarly, prospect theory suggests that when faced with the prospect of losses and gains, people are more risk adverse to losses than to gains.⁵⁵ This suggests the importance of risk perception or dread when evaluating risk, which can involve things as varied as emotions, biases, personality, experiences, context and culture. Prospect theory set the framework for the study of behavioral economics. This is a growing area of study that examines how emotions and human limitations can inhibit rational decision-making involving risk vs. reward.⁵⁶

Slovic classifies three elements of risk: (a) risk as analysis, (b) risk as politics, and (c) risk as feelings. He argues that intuitive feelings “are still the predominant method by which human beings evaluate risk.”⁵⁷ He discovered that people’s decisions and judgments were affected by whether they liked something or disliked something. Slovic characterized this as the *affect* heuristic. People who liked something tended to perceive risk as low and benefits high; those who disliked something perceive risk as high and benefits low. This suggests that judgments, decisions, and behaviors are influenced by our risk perception, which depends on not only how we think about things, but also about how we feel (affect heuristic).⁵⁸

Sandman expands on the notion of risk as feelings by defining risk as equal to hazard + outrage. People’s risk perceptions are influenced by various factors such as controllability, dread, and fairness, etc. This is often the reason that the public’s risk

⁵³ Roszkowski and Davey, “Risk Perception and Risk Tolerance,” 44.

⁵⁴ Ibid.

⁵⁵ Kahneman and Tversky, “Prospect Theory,” 263–291.

⁵⁶ Robert Shiller, *Finance and the Good Society*, Kindle edition (New York: Princeton University Press, 2012), xiv; Shiller, “Workshop in Behavioral Finance,” <http://www.econ.yale.edu/~shiller/behfin/index.htm>

⁵⁷ Slovic et al., “Risk as Feelings,” 311.

⁵⁸ Ibid.

perception of events can be quite different from those of experts. In this instance, addressing the level of outrage, either increasing or decreasing it, is key to controlling the level of perceived risk.⁵⁹

There are important parallels in both domains that help explain psychological and political behaviors and decisions that manifest themselves in the temporal nature of risk taking and risk adversity. The literature suggests that the meaning of risk is really in the eye of the beholder. In general, risk is a known probability of loss, while uncertainty is an unknown probability of loss. The social sciences have incorporated feelings and emotions as a major part of the makeup of risk. Both in finance and in homeland security, behavioral science and behavioral economics helps us to understand why people will go to great lengths to prevent losses, even if they expect gains. In some instances our feelings represent risk as outrage, whether or not associated hazards are indeed real or not. In summary, the literature shows that our feelings or general affective view on things guides our risk perception and influences our decisions and behaviors.

⁵⁹ P. Sandman, ed., *Hazard Versus Outrage in the Public Perception of Risk* (New York: Plenum Press, 1989): 45–49; S. Dubner and S. Levitt, *Freakonomics*, Revised and expanded ed. (New York: Harper Collins e-books, 2010), 136–139.

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III. ANALYSIS

A. DOMAIN BEHAVIOR – UNDERSTANDING MARKET BEHAVIOR

In the journey to understand the conceptual metaphor *homeland security as a stock market*, it is important to understand how stock markets behave and seek analogies to homeland security. Financial markets revolve around the continuous flow and interpretation of information. Transactions in the market serve as a means of price discovery, where investors learn the value of whatever is being traded.⁶⁰

There are two primary economic beliefs that explain how financial markets operate and behave. The first, the *efficient market hypothesis*, is the belief that stock market prices reflect all available information within the market.⁶¹ In such a setting, financial markets are efficient. Alternatively, behavioral economists have shed new light on the nonefficient nature of financial markets, what one might call the *inefficient market hypothesis*. This is in large part due to research in social sciences reflecting the biases, behaviors and feedback of the market participants themselves.

The *complexity market hypothesis* incorporates complexity theory to describe the behaviors of financial markets. While there is no accepted definition of complexity theory, it can be generally described as the study of the interconnected parts of a system that exhibit different behaviors from the individual parts and how these interconnected parts move from a state of equilibrium to upheaval.⁶²

1. The Efficient Market

The efficient market hypothesis was popularized in 1970 by Eugene Fama, for his paper entitled, “Efficient Capital Markets: A Review of Theory and Empirical Work.” He

⁶⁰ Robert Shiller, *Finance and the Good Society*, 555.

⁶¹ Eugene Fama, “Efficient Capital Markets: A Review of Theory and Empirical Work,” *Journal of Finance* 25, no. 2 (May 1970): 383–417.

⁶² Mark Buchanan, *Ubiquity: Why Catastrophes Happen* (New York: Three Rivers Press, 2001), 273; Ted Lewis, *Bak’s Sand Pile* (Williams California: Agile Press, 2011), 46; Melanie Mitchell, *Complexity A Guided Tour*, Kindle edition (New York: Oxford University Press, 2009), 335.

defines an efficient market as one where prices “fully reflect all available information” at any particular moment in time.⁶³ If all available information, including future expectations, is incorporated into the prices of stocks, then expected returns can be no better than the aggregate return on benchmark index funds. Burton Malkiel, a leading proponent of the efficient market hypothesis states that efficient financial markets “do not allow investors to earn above-average returns without accepting above-average risks.”⁶⁴ As information is incorporated into markets, “stock market price movements,” says Malkiel, “approximate those of a random walk. If new information develops randomly, then so will market prices, making the stock market unpredictable.”⁶⁵ The difficulty in reliably forecasting changes in prices has often been a testament to the efficiency of the markets.

Malkiel does not doubt that short-term opportunities for investors might exist, due to volatile behavior, however he believes that the market would quickly capitalize on this. Thus, over longer periods of time, markets always behave in an efficient manner. Similarly, Fama does not assert that markets are always efficient and suggests some potential sources of market inefficiencies, such as transaction costs, restricted information, and different interpretations of information. However, Fama neglects any discussion or mention of market bubbles as symptoms of irrational market behavior.

When viewed over longer periods of time, such as 10–30 years, the efficient market hypothesis gives us a useful way to think about systems involving humans and transactions.⁶⁶ This hypothesis shows that in general, those who try to outsmart the market fail. However, this hypothesis seems to be based over longer periods of time as most literature does not discuss short-term (1–3 years) market fluctuations. This is often the period of time where market fluctuations can give the appearance of an inefficient market. If the efficient market hypothesis may be a useful way of thinking about the

⁶³ Fama, “Efficient Capital Markets,” 383.

⁶⁴ Burton Malkiel, “The Efficient Market Hypothesis and its Critics,” *Journal of Economic Perspectives* 17, no. 1 (Winter 2003): 60.

⁶⁵ Burton Malkiel, “Reflections on the Efficient Market Hypothesis: 30 Years Later,” *Financial Review* 40, no. 1 (Feb 2005): 1.

⁶⁶ *Ibid.*

behaviors of humans and transactions, how might the homeland security realm exhibit similarities of an efficient market?

An efficient homeland security market can likewise represent a continual flow of information and intelligence. This is usually made up of threats and countermeasures. With a diverse and active intelligence community, threats are analyzed and their risks communicated. Appropriate and proportionate countermeasures are executed as the result of thorough and continuous monitoring of the threats in the strategic environment.

In a homeland security system acting as an efficient market, advantages and exploitations from either an adversary perspective (i.e., threats), or from a government perspective (i.e., countermeasures) are short lived, as each entity acts and reacts to the other and the available information in the environment. Should intelligence detect growing or mounting threats (e.g., future expectations of potential attacks), then more robust and/or more complex countermeasures must be deployed to deter, or protect against the growing threats. In this case, more is at stake and the price or value of the exchange between threats and countermeasures increases.

Adversaries conveying threats are not only terrorist actors and violent extremists. Homeland security is also concerned with protecting against and responding to natural disasters (e.g., fires, floods, hurricanes, earthquakes, and tornados). These “adversarial” events engage and challenge homeland security preparedness, response, and recovery countermeasures. Intelligence gathering, analysis and public communication of threats are key to executing effective countermeasures. This is rarely a simple proposition. For instance, look to the events surrounding Hurricane Katrina in New Orleans to see the impacts of failed intelligence and communication on safety and security in the impacted region.

2. The Inefficient Market

Pundits of the rational/efficient market theory will point to recent bubbles as evidence that this theory is flawed. Economists George Akerlof and Robert Shiller argue that conventional understanding of economics does not explain financial roller

coaster rides nor the occasional need for government intervention in the markets. Explanations for how markets can behave irrationally must consider animal spirits. These intangibles include social and investor mood, changing levels of confidence, illusions and evil (envy, greed, etc.). Akerlof and Shiller offer anecdotes to underscore their point (boom and busts in the stock market, oil market, and the housing crisis).⁶⁷

Another example highlighted by Shiller is Federal Reserve Chairman, Alan Greenspan's use of the term "irrational exuberance" to describe the over-heated, and overvalued stock market in 1996.⁶⁸ Despite Greenspan's early warnings, the market, known as the dot-com boom, continued to inflate until it crashed in 2000. Other recent financial bubbles include: the 2008–2009 Great Recession; the 1998 Russian financial crisis; the 1997 Asian financial crisis; and the 1987 Black Monday, where the stock market lost almost 23% in one day.⁶⁹ Willingness to take on too much risk was a likely catalyst for these stock market bubbles. In some cases, risk acceptance was intentional, as investors clamored for more return than the market had historically provided. In other cases, some investors simply failed to understand risk or discounted it altogether as they too easily explained circumstances in the market and society that made this time different than the past.

Many of these examples illustrate a lack of government regulations to guard against society's so-called animal spirits. Akerlof and Shiller discuss how social narratives affect the overall public confidence that continues to drive up or down the existing economic swings. This becomes a reinforcing feedback loop. Lastly they argue that government policy needs to consider these animal spirits if that policy or regulation is going to be effective. Financial regulations are generally intended to manage and mitigate risk through risk transfer. This can be very relevant to our understanding of how regulations are supposed to work in a political or homeland security environment and what their unintended effects can be. Akerlof and Shiller fall short, however, in

⁶⁷ George Akerlof and Robert Shiller, "How 'Animal Spirits' Destabilize Economies," *Mckinsey Quarterly*, no. 3 (2009): 126–135.

⁶⁸ Robert Shiller, "Irrational Exuberance," <http://www.irrationalexuberance.com/definition.htm>.

⁶⁹ E. S. Browning, "Exorcising Ghosts of Octobers Past," *Wall Street Journal*, Oct 15, 2007.

describing how to account for these animal spirits. They simply recognize that they exist and highly influence the market.⁷⁰

In a similar fashion, bubbles can also be seen from a homeland security system perspective. Inadequate and inappropriate countermeasures can occur for numerous reasons, including but not limited to complacency, fiscal reductions, and not understanding or underestimating the dynamic and agile nature of threats. Not having the necessary countermeasures in place increases risk in the homeland security system and can lead to a vacuum bubble of *under-protection*. Similar to the stock market, risk is sometimes taken on intentionally or accepted; however it can also be taken on unintentionally or not understood. The events of 9/11, Hurricane Katrina, and the surprise attack on Pearl Harbor are some of the most notable Black Swan events where the United States clearly underestimated the threats and indicators from adversaries.⁷¹ These examples illustrate the lack of imagination and arguably, the willingness, to see the developing bubble that would surround them.⁷²

Perhaps even more common in a post-9/11 environment, though sometimes inconspicuous, is a bubble of *over-protection*, which can entail massive use of resources and sometimes include the sacrifice of both individual and the public's personal liberties in exchange for safety. This is enabled through the regulatory process, as part of overly employing risk mitigation measures. The stock market analogy would be an overly conservative portfolio that returned far less than the market average in order to shun risk and preserve assets. However, an overly conservative portfolio can be very costly in terms of the missed opportunities for growth. Benjamin Franklin famously said, "They who can give up essential liberty, to obtain a little temporary safety, deserve neither

⁷⁰ Akerlof and Shiller, "How 'Animal Spirits' Destabilize Economies," 126–135.

⁷¹ Made popular by Nassim Taleb, a Black Swan signifies the occurrence of a low probability, high consequence event. Taleb notes that surprise and our innate desire to explain the Black Swan after the fact (hindsight), are fundamental characteristics of Black Swans. See Nassim Taleb, *The Black Swan: The Impact of the Highly Improbable* (New York: Random House, 2007)

⁷² The attack on Pearl Harbor, which ushered the U.S. into WW II, is often compared with the events surrounding 9/11 because of the element of surprise and the transformative nature of the events.

liberty nor safety.”⁷³ In homeland security, what is the cost of sacrificing our liberty for temporary safety? Over-protection in national and homeland security events might include hysteria such as the 1798 Alien and Sedition Acts, the rise of the Red Scare in the 1950s and arguably the unsustainable post-9/11 buildup of homeland security resources and laws allowing the government unprecedented security measures to *prevent* attacks on the homeland.⁷⁴

Behavioral economics and behavioral science describes how individual decisions are influenced by other individual actions and biases, as well as market mood and sentimentality. In many respects, our individual biases lead us to irrational decisions, which in turn affect the collective of the overall market sentiment and direction, thus affecting the decisions of others. This creates multiple self-sustaining feedback loops, which are sometimes seen in the cyclical nature of markets; sometimes emerging as a series of booms and busts. Similar behaviors can be described by complex self-organizing systems.

3. The Complex Market

While markets may demonstrate complex interactions and behaviors, economists have only recently begun to look towards complexity theory to better explain such market behaviors. Complexity theory describes the study of interconnected parts of a system that exhibit different behaviors from the individual parts and how these interconnected parts have the ability to move from a state of equilibrium to upheaval.⁷⁵

Mark Buchanan describes Per Bak’s *sand pile model* as a metaphor for observing and explaining complex systems. In this model, grains of sand are continuously piled on top of one another until the pile eventually collapses. What interested Bak, was how big

⁷³ Benjamin Franklin, *Memoirs of the Life and Writings of Benjamin Franklin*, Google ebook ed., Vol. I (London: A.J. Valphy, 1818), 270.

⁷⁴ Charles Doyle, *The USA Patriot Act: A Legal Analysis*, CRS Report 31377 (Washington, D.C.: Library of Congress, Research Service, April 15, 2002), <http://www.fas.org/irp/crs/RL31377.pdf>; Ron Suskind, *The One Percent Doctrine* (New York: Simon and Schuster, 2006), 62–64.

⁷⁵ Buchanan, *Ubiquity: Why Catastrophes Happen*, 273; Mitchell, *Complexity A Guided Tour*, 335; Lewis, *Bak’s Sand Pile*, 46.

the pile might grow and when it would collapse. While some piles grew comparatively large and unstable before collapsing, other piles collapsed when relatively small. Repeating this phenomenon thousands of times using computers showed that the point of collapse is chaotic and cannot be predicted precisely. Buchanan concluded his findings by citing the ubiquitous nature of the critical self-organizing state in networks found throughout all things. All upheavals show some nature of self-organized criticality, including pandemics, hurricanes, forest fires, terrorism and financial market bubbles.⁷⁶

Economist Hyman Minsky discusses the paradox of financial market tendencies to go from stability to fragility in his Financial Instability Hypothesis. Minsky writes, “over periods of prolonged prosperity, the economy transits from financial relations that make for a stable system to financial relations that make for an unstable system.”⁷⁷ This suggests the inherent need for volatility in complex systems, without which, systems would become unstable (bubble) to the point of dramatic collapse. Reflecting on Minsky’s work, economic authors Mauldin and Tepper declare that, “the longer the period of stability, the higher the potential risk for even greater instability when market participants must change their behavior.”⁷⁸ After prolonged periods of stability, this change in behavior is often sudden, leading to collapses or signifying the bursting of a bubble. This builds upon the sand pile idea that both stable and instable systems are dependent on time and volatility, including the domains of financial markets and homeland security.

Andrew Haldane draws analogies from the complexities of ecological food webs as a model descriptor of the interplay between complexity and stability in financial ecosystems. Haldane calls for the need to address and emphasize systemic risk in the banking system rather than address individual bank risks. In the run up to the 2008 financial crisis, banks increasingly relied on trading derivatives, structured credit, and financial engineering as a means to generate trading profits while spreading risk

⁷⁶ Buchanan, *Ubiquity: Why Catastrophes Happen*, 273.

⁷⁷ Hyman P. Minsky, “The Financial Instability Hypothesis: An Interpretation of Keynes and an Alternative to ‘Standard’ Theory,” *Challenge* 20 (Mar 1977): 20.

⁷⁸ John Maudlin and Jonathan Tepper, *Endgame: The End of the Debt Supercycle and How it Changes Everything* (Hoboken: Wiley and Sons, 2011), 37–38.

throughout the financial system.⁷⁹ This led to an increase in banking homogeneity, where all banks tended to do the same thing. Haldane notes, “Excessive homogeneity within a financial system...can minimize risk for each individual bank, but maximize the probability of the entire system collapsing.”⁸⁰

This is a classic example of Hardin’s *Tragedy of the Commons*. In Hardin’s example, a common resource is shared by all, with each individual attempting to maximize their use of the resource to the detriment of the others. This excessive homogeneity comes with the expense of greater systematic risk; ultimately destroying the commons and collapsing the system. “Therein is the tragedy,” Hardin notes, as man pursues “his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.”⁸¹ Hardin’s proposed approach to this problem is not directly forcing behavioral changes, but rather by *not* maintaining a commons. This can be accomplished through social arrangements such as taxes, fees or regulations that allocate costs to those users who benefit the most.⁸² For instance, the 9/11-security fee charged to airline passengers could be described as one means of charging for the use of the commons. Passengers and other stakeholders who benefit the most should also contribute the most.

Haldane has proposed a similar approach to the problem of the financial ecosystem commons, as seen through excessive banking homogeneity. To reduce banking homogeneity and increase financial ecosystem diversity, there must be larger liquidity and capital ratios requirements proportionate to the size of the bank.⁸³ This may mean that some banks would have to breakup or would prefer to breakup rather than maintain larger capital ratio requirements. Additionally, developing incentive based requirements may also help increase systemic banking diversity.

⁷⁹ Andrew G. Haldane and Robert M. May, “Systemic Risk in Banking Ecosystems,” *Nature* 469, no. 7330 (Jan 20, 2011, 2011): 351–5; Lawrence J. White, “Preventing Bubbles: What Role for Financial Regulation?” *CATO Journal* 31, no. 3 (Fall 2011): 603–619.

⁸⁰ Haldane and May, *Systemic Risk in Banking Ecosystems*, 351–5.

⁸¹ Garrett Hardin, “The Tragedy of the Commons,” *Science* 162, no. 3859 (13 Dec 1968), 1244.

⁸² *Ibid.*, 1243–1248.

⁸³ Haldane and May, *Systemic Risk in Banking Ecosystems*, 351–5.

In the homeland security realm, this suggests the question: Has terrorism become a homogenous catch phrase within DHS? Are the activities and growth of DHS driven and sustained in large part by the fear of terrorism? Highlighting this, Congress defines homeland security in four elements, each of which is exclusively centered around terrorism.⁸⁴ Just as excessive homogeneity among banks led to increased systemic risk and eventually financial collapse, is the fear of terrorism leading to excessive homogeneity within homeland security? If so, does this suggest a similar path towards collapse?

Using the sand pile analogy, Haldane's ideas might reflect the forcing of smaller homeland security sand pile collapses before they are allowed to grow too big. While this would serve to increase the overall volatility of the system, it would likely reduce the fragility of the homeland security system by minimizing the potential for catastrophic market bubbles and sand pile collapses.

While research in behavioral economics shows that markets can exhibit inefficient behaviors, how do we reconcile evidence that markets are both efficient and inefficient? The complex market hypothesis may be a better way to understand both the efficient and inefficient nature of markets involving human interactions. Evidence for and against efficient, inefficient, or complexity-based markets should not be viewed as conclusive. These hypotheses inform us how markets or systems as a whole tend to behave over certain periods of time. Analogies link these aggregate behaviors to the homeland security domain. Examining how we think about risk, uncertainty, and behavioral and systemic biases will also inform our understanding of the behavior of markets, both financial and homeland security markets.

⁸⁴ *Assessing DHS Ten Years Later: How Wisely is DHS Spending Taxpayer Dollars?: Before the Subcommittee on Oversight and Management Efficiency, House Committee on Homeland Security* (Feb 15, 2013) (Written Testimony by Shawn Reese, Congressional Research Analyst). The four elements which Congress uses to define homeland security are: (1) to prevent terrorist attacks within the United States; (2) to reduce the vulnerability of the United States to terrorism; (3) to minimize damage from a terrorist attack in the United States; and (4) to recover from a terrorist attack in the United States.

B. MANAGING AND MITIGATING RISK

1. Regulations

Regulations are a key method for governments to try to manage risks and promote the well being of society.⁸⁵ In financial markets, risk can be mitigated and managed through the use of regulations. Glass-Steagall, Sarbanes-Oxley, Dodd-Frank, market manipulation rules, and insider trading laws are just some of the many examples that attempt to regulate risk in the financial markets, maintain efficient markets and reduce the chance of bubbles from forming.

George Akerlof argues that information in markets is often asymmetric, where information between the buyer and seller can be unequal. In these instances, government intervention is sometimes necessary to protect buyers, and thus preserve and minimize risk in the marketplace. His point is that in practice, we see all sorts of inefficiencies and the government has a role in attempting to create a more fair and efficient market through regulations.⁸⁶

However, sometimes regulations have unintended consequences; many are too restrictive and limit market/economic freedoms and growth, while others may be subverted through loopholes. Some regulations can sometimes be built upon faulty assumptions and can introduce unintended risk into the market place. A good example of this was the 2001 Recourse Rule, which offered incentives for banks to hold securitized mortgages rather than the mortgages themselves. With securitized mortgages, banks bundled actual mortgages into one large pool and then sliced the pool into smaller pieces or tranches based on the inherent risk of default of each mortgage. This allowed the mortgages to be resold to investors based on a risk profile, similar to a bond. While this

⁸⁵ Mark G. Stewart, Bruce R. Ellingwood and John Mueller, "Homeland Security: A Case Study in Risk Aversion for Public Decision-Making," *International Journal of Risk Assessment & Management* 15, no. 5 (July 2011), 367–386; Shiller, *Finance and the Good Society*, 555.

⁸⁶ George Akerlof, "The Market for 'Lemons: Quality, Uncertainty, and the Market Mechanism,'" *Quarterly Journal of Economics* 84 (1970): 488–500.

allowed banks to free up capital to increase lending, it also contributed to creating more systemic risk, ultimately culminating in the financial crisis in 2008.⁸⁷

Legislation, as the regulating entity, also plays an important role in managing and limiting risk in the homeland security system. Notable examples include the USA Patriot Act and subsequent amendments, the 2002 Homeland Security Act, Post-Katrina Emergency Management Act, Aviation and Transportation Security Act, Intelligence Reform and Terrorism Prevention Act of 2004, as well as other fiscal and authorization based laws. By defining and mostly expanding how the government can respond to threats, regulations attempt to mitigate homeland security risk and lessen the chance of a bubble of *under-protection* in the homeland security system. However, as previously mentioned, regulations can also be too restrictive and limit individual freedoms or be ineffective and be subverted with loopholes. This can result in a misunderstanding of risk or believing that less risk exists in the system than there is.

2. Derivatives

Financial derivatives are widely attributed as being a leading cause of the collapse of the financial bubble in 2008.⁸⁸ A derivative, as its name implies, is a product that derives its value from another product. Derivatives are commonly used to bet on the future value of something, usually commodities. Farmers have used derivatives for hundreds of years to protect their crops from fluctuating prices due to changes in weather. Derivatives can be speculative in nature or can act as insurance by transferring risk from one party to a counterparty or even the entire financial system.

The idea of the Credit Default Swap (CDS) grew from the use of derivatives in the commodities market. A CDS is a type of derivative that insures a loan against a default. In the late 1990s, financial companies issued credit derivatives on individual company debt and later shifted to writing derivatives on bundles of debt to form a portfolio of credit risk. This debt was securitized, or sold by slicing it into tranches of

⁸⁷ Shiller, *Finance and the Good Society*, 555.

⁸⁸ Carol Loomis, "Derivatives: The Risk that Still Won't Go Away," *Fortune*, July 6, 2009, 55–60.

debt risk, creating Collateralized Debt Obligations (CDOs).⁸⁹ This financial innovation created a new market for buying and selling financial insurance and offered new opportunities for profits. Risk could now be easily traded and transferred into the future and credit derivatives made it possible for banks to skirt capital requirements.

Many in finance at the time believed that risk to the firm could be eliminated using these derivatives. However, rather than eliminating risk, it spread throughout the banking system. As more derivatives were written and traded, the risk inherent within the financial system grew exponentially. Between 2000 and 2008, “the world-wide notional value of derivatives went from \$95 *trillion* to \$684 *trillion*.”⁹⁰

Obfuscating the growing level of systemic risk was the fact that the derivatives market was and still is a private market; unregulated and out of view. The common denominator of these mortgage-backed securities was the health or solvency of the housing market. For Wall Street to continue to make profits from these mortgage-backed securities, the prices of homes across the nation had to continue to rise so the system of payments remained solvent. When the prices of homes reversed course, a freeze on loans suddenly occurred due to insolvency of the system, and the public trust and confidence in the housing market collapsed. The financial instruments built on these housing foundations became untenable. Just as all of Bak’s Sandpiles eventually come crashing down, so too did the financial markets.

Similarities can be seen in total government debt and unfunded entitlements and liabilities. The economy is a fundamental of American power and the foundation for homeland and national security. However, fiscal realities have shed new light on the

⁸⁹ Frontline, *Money, Power and Wall Street*, directed by Michael Kirk, Season 30, episode 10, 2012; CDOs made it easier to sell bundles of debt to investors, who could choose how much risk they were willing to take. The next application of CDOs was to portfolios of consumer credit risk, namely mortgage credit risk. Other financial innovations, such as Synthetic CDOs, and CDO² (CDOs of CDOs) grew out of this process. Writing these derivatives proved to be very profitable for banks. Existing regulations, such as the Recourse Rule, allowed banks to bypass existing capital requirements by offering “special incentives for banks to hold securitized mortgages rather than mortgages themselves.” See Shiller, *Finance and the Good Society*, 1529–1546.

⁹⁰ Loomis, *Derivatives*, 57.

emerging financial threat to homeland security and national security.⁹¹ The U.S. Treasury noted in a 2011 financial report that the government must bring “expenses and resources into balance before the deficit and debt reach unprecedented heights.” As recently as August 2012, the total U.S. government debt to Gross Domestic product ratio exceeded 108%.⁹²

Just as unregulated financial derivatives generated systemic risk within the financial sector, the growth of unfunded entitlements and liabilities has introduced a growing level of systemic risk to the financial health of the U.S. According to the Treasury Department’s 2012 financial statement, unfunded Social Security and Medicare obligations exceed \$66.3 trillion.⁹³ At well over four times the reported debt level, a GAO audit notes that “absent policy changes—the federal government continues to face an unsustainable fiscal path.”⁹⁴ This suggests that similar to financial derivatives, the U.S. is underwriting insurance on making future payments; transferring obligations and risk into the future.

The unsustainable growth of U.S. government debt is endangering the public’s confidence in the government’s ability to repay the debt. Government debt is derived from the public trust and confidence that investors will *always* be repaid. This has led to the assumption that U.S. government securities are risk-free securities. However, investor confidence in this assumption may start to wane as deficits continue to grow unabated. In this instance, investors will no longer buy the debt derivatives of the U.S. government, risking a collapse of the financial engine of the country and posing a real threat to the

⁹¹ U.S. Department of Homeland Security, “Homeland Security and Economic Security;” ADM Michael Mullen has in multiple venues cited the national debt as the most significant threat to national security.

⁹² Bureau of Economic Analysis, “National Income and Product Accounts: Gross Domestic Product, 2nd Quarter 2013,” U.S. Department of Commerce, <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; Treasury Direct, “The Daily History of the Debt Results,” U.S. Department for the Treasury, <http://www.treasurydirect.gov/NP/debt/current>. As of Oct 24, 2013 the Total U.S. Debt was \$ \$17,077.7 billion and the 2nd Qtr GDP (real) was \$15,679.7 billion.

⁹³ Department of the Treasury, *Fiscal Year 2012 Financial Report of the United States Government*, 189, <http://www.fms.treas.gov/fr/12frusg/12frusg.pdf>.

⁹⁴ *Ibid.*, 225.

security and well being of the nation. Without the foundation of a strong economy, there is nothing to support a diverse and robust homeland security enterprise.

3. Career and Political Risk

Career risk also plays into the overall risk appetite of the financial market. “Professional investors find it hard to wait out an overpriced market,” and many have lost their jobs refusing to buy booming stocks.⁹⁵ Likewise, holding losing stocks can be just as harmful to the careers of fund managers. The hazards of buying high or selling low are real, but in many instances, not owning winning stocks can drive the overall risk picture for fund managers. Using Sandman’s definition of risk, fund managers must address both the hazards and the outrage of their clients.⁹⁶ This suggests that fund managers end up chasing the market to keep their jobs and reputation to give the illusion that funds hold winning stocks.

Political career risk also plays a part in the overall risk appetite of the homeland security system. Shortly after the events of 9/11, there was little appetite for risk in the homeland security system. In a CNN Poll conducted the day after the 9/11 attacks, “66% of Americans surveyed said they would be willing to give up some of their liberties” to fight and prevent terrorism.⁹⁷ Similarly, Gallup polling conducted within one month after the 9/11 attacks showed that 59% of those polled were worried that they or a member of their family would become a victim of a terrorist attack, while 88% expressed their confidence in the government’s ability to protect its citizens from future terrorist attacks.⁹⁸ While polls are certainly not perfect, they can be a useful proxy of the nation’s feelings and attitudes at the time. These results suggest that fear and anger gripped the

⁹⁵ Pat Reginer, “Can You Outsmart the Market?” *Fortune*, Dec 21, 2009, 58.

⁹⁶ Sandman, *Hazard Versus Outrage*, 45–49.

⁹⁷ Liana Epstein and Phillip Atiba Goff, “Safety Or Liberty?: The Bogus Trade-Off of Cross-Deputization Policy,” *Analyses of Social Issues & Public Policy* 11, no. 1 (Dec 2011): 314–324.

⁹⁸ Gallup, “Terrorism in the United States,” <http://www.gallup.com/poll/4909/terrorism-united-states.aspx>.

nation and action was expected from the government. Politicians had to address both the terrorism hazards as well as the public's outrage following the 9/11 attacks.⁹⁹

Addressing hazards and outrage in a post-9/11 environment, the Bush Administration adopted what Ron Suskind calls the "one percent doctrine." This is a response oriented terrorism philosophy attributed to Vice President Cheney that argues that even a one percent chance or risk of terrorism needed to be taken as a certainty. Suskind notes that Cheney declares, "It's not about our analysis, or finding a preponderance of evidence, it's about our response."¹⁰⁰ This suggests that post-9/11, the Administration's response to terrorism risk was that it was something to be *eliminated* not mitigated. This had to be achieved by targeting both the hazards of terrorism as well as managing the public's outrage.

In a similar respect, public outrage from terrorism can demand homeland security leadership to adjust and employ numerous and often-costly antiterrorism activities, even if these actions cannot be proven effective. Many antiterrorism activities and programs are deterrent oriented. GAO notes that the success and effectiveness of some deterrent based programs, such as the TSA's airport security screening or the Coast Guard's port security activities, are unknown due to a lack of data or evidence that such programs have stopped or caught terrorists.¹⁰¹ Deterrence programs attempt to prevent an event, which makes measuring the absence of an event difficult. With these and similar programs, their effectiveness in reducing actual hazards is unclear.

On the other hand, one might infer that these programs have had an impact on the public's risk perception and feeling more secure, thus mitigating the outrage related to terrorism. Using Gallop polls as a proxy for public sentiment, in January 2002, 51%

⁹⁹ Sandman, *Hazard Versus Outrage*, 45–49.

¹⁰⁰ Suskind, *The One Percent Doctrine*, 62–64.

¹⁰¹ *TSA has made Progress, but Additional Efforts are Needed to Improve Security: Hearings Before the Subcommittee on Oversight, Investigations, and Management, House Committee on Homeland Security* (Sep 16, 2011) (Written testimony by Stephen Lord, Director of Homeland Security and Justice Issues, U.S. Government Accountability Office), <http://www.gao.gov/assets/130/126981.pdf>; U.S. Government Accountability Office, *Coast Guard: Security Risk Model Meets DHS Criteria, But More Training Could Enhance its Use for Managing Programs and Operations*, GAO-12-14 (Nov 2011), <http://www.gao.gov/assets/590/587144.pdf>.

responded that they were satisfied with the nation's security from terrorism. Ten years later, this number swelled to 71%.¹⁰² Though the effectiveness of many antiterrorism activities is unclear, sometimes investors are happier knowing that they own "winning" stocks, regardless of their actual portfolio returns.

C. PREDICTING THE MARKET – BIASES IN RISK DECISION MAKING

Accounting for personal biases can make timing the stock market or the homeland security market a recipe for disaster. Even if one believes in a rational/efficient market theory, the fact that bubbles still form demonstrates that sometimes markets can act incredibly irrational. At any given point in time, reviewing basic market statistics, such as price to earnings or book values will show that sometimes stocks are more expensive, and at other times less so. This fact is what drives many individuals and market professionals to time the market or make market-based predictions. However, most market experts are woefully unsuccessful in market timing. In 2009, only one third of all large-capitalized stock mutual funds matched or beat the market (S&P 500) over a five-year period.¹⁰³ These poor performance metrics highlight the difficulty in reliably forecasting price changes and are a testament to the efficiency of the markets.

In timing the homeland security market, numbers and statistics are often more elusive, especially when it concerns predictions. Can one effectively time the homeland security market by employing just-in-time countermeasures in response to emergent or growing threats? If an attack does not occur, were countermeasures effective? If an attack does occur, were countermeasures ineffective and worthless?

Even without definitive statistics, can expert intelligence in the market make it possible to gauge the level of threats, evaluate countermeasures, and understand the level of risk in the system? If the underperformance of experts in the financial domain is any indication, experts timing the homeland security market may prove just as poor. A leading reason for this is our personal biases impact our ability to accurately gauge and

¹⁰² Gallup, "Terrorism in the United States."

¹⁰³ Reginer, "Can You Outsmart the Market?," 58.

correctly interpret information in the market. Understanding the role biases play in decision-making may allow us to better account for our own shortcomings when it comes to evaluating risk and understanding uncertainty.

1. Expert Predictions

In an efficient market, future prices of securities defy prediction. This suggests that, in a more literal comparison, both financial and homeland security experts are hard pressed to differentiate their opinions and predictions from those of the average person. Taleb describes how overconfidence, especially among experts, often leads to sub-optimal as well as devastating predictions. He describes research citing thousands of predictions by financial security analysts that ultimately predicted “nothing.”¹⁰⁴

Similar to financial security analysts predicting nothing, psychologist Philip Tetlock conducted a study in which nearly 300 experts made over 80,000 predictions of various political, military, and economic events in the near future. These experts consisted of a mix of noted homeland security, national security, and economic professionals. Tetlock was curious to see if expert knowledge across the security and financial domains had any link to being able to make more accurate predictions than simple algorithms or by someone who was not an expert. The conclusions of the study revealed that “across all judgments, experts on their home turf made neither better calibrated nor more discriminating forecasts than did dilettante trespassers.”¹⁰⁵ From this study, Tetlock deduced that when making predictions by noted experts, “it is impossible to find any domain in which humans clearly outperformed crude extrapolation algorithms” - what Tetlock calls “the functional equivalent of dart-throwing chimps.”¹⁰⁶

Of course experts have “too great a vested interest in self-promotion to cease and desist from supplying snake oil forecasting products.”¹⁰⁷ Those experts in demand tend

¹⁰⁴ Nassim Taleb, *The Black Swan: The Impact of the Highly Improbable* (New York: Random House, 2007), 150.

¹⁰⁵ Philip Tetlock, *Expert Political Judgment: How Good Is It? How Can We Know?* (Princeton, NJ: Princeton University Press, 2005), 54.

¹⁰⁶ *Ibid.*, 41, 54.

¹⁰⁷ *Ibid.*, 62–63.

to be overconfident in their predictions, which in turn may drive more exposure and attention by the media. As Tetlock describes, “authoritative-sounding experts, the ratings-conscious media, and the attentive public—may thus be locked in a symbiotic triangle.”¹⁰⁸

In spite of the poor track record of experts in forecasting, we should not expect our reliance on expert prognostications to wane. As humans, we seem to strive for simplification and explanation of events in cause and effect narratives. This might suggest our belief in modern fatalism, where the future is a linear derivation of the past and present. Tetlock summarizes this by describing:

...our reluctance to acknowledge the unequivocal evidence that experts cannot out predict chimps keeps us needlessly looking for predictive cues and heuristics well beyond the point of diminishing returns. We—the consumers of expert pronouncements—are in thrall to experts for the same reasons that our ancestors submitted to shamans and oracles: our uncontrollable need to believe in a controllable world and our flawed understanding of the laws of chance. We lack the willpower and good sense to resist the snake oil products on offer. Who wants to believe that, on the big questions, we could do as well tossing a coin as by consulting accredited experts?¹⁰⁹

Additionally, the relationship between experts, the attentive public, and the media can tend to drive and influence herding patterns across all groups. Similar to Tetlock, Taleb notes how behavioral traits such as greed and illogical rationalization induces herding patterns and prediction errors.¹¹⁰ Kahneman goes farther, explaining how overconfidence is highly valued, both socially and economically. The competitive pressure for experts to be valued “creates powerful forces that favor a collective blindness to risk and uncertainty.”¹¹¹

Relating to herding patterns of experts, Kahneman gives insight into the wisdom of the crowds. This belief, first popularized by James Surowwiecki’s book of the same

¹⁰⁸ Ibid.

¹⁰⁹ Ibid., 63.

¹¹⁰ Taleb, *The Black Swan*, 150–164.

¹¹¹ Kahneman, *Thinking, Fast and Slow*, 262.

name, shows that while individuals often do very poorly at judgments and predictions, pools of judgments can be quite accurate. However, Kahneman notes that this holds true *only* when individual judgments and their errors are made independent of each other. In other words, when individual observations are not subject to any systematic bias, the errors of their judgments average to zero. However, “if the observers share a bias, the aggregation of judgments will not reduce it. Allowing the observers to influence each other effectively reduces the size of the sample, and with it the precision of the group estimate.”¹¹²

In a similar fashion, wisdom of the crowds can be a good descriptor of efficient markets. However, as Kahneman notes, once systematic biases are introduced, the market can quickly become inefficient. In today's more dynamic and interconnected social and economic settings, it is hard to imagine when we are not actually subject to group or shared biases. This suggests that the crowds and experts are not as smart as we think.

Concerning shared biases, groupthink plays a significant role in shaping the wisdom of the crowd by creating systematic herding patterns. Groupthink describes how a group can take on norms that can be arbitrary and incorrect and how these norms influence behaviors and decisions. Irving Janis first described groupthink in 1972 studying the impact of group policy decisions on fiascoes such as Pearl Harbor, the Korean War, the Bay of Pigs, and the escalation of Vietnam.¹¹³ According to Janis, groupthink describes a “concurrence-seeking tendency that fosters over-optimism, lack of vigilance, and sloganistic thinking about the weakness and immorality of out-groups.”¹¹⁴ In all instances, group uniformity and loyalty took precedence in decision-making, even when a “policy was working badly and had unintended consequences that disturbed the conscience of the members.”¹¹⁵ This group loyalty acted as a barrier to individual member dissent or from raising controversial issues.

¹¹² Ibid.

¹¹³ Irving L. Janis, “Groupthink and Group Dynamics: A Social Psychological Analysis of Defective Policy Decisions,” *Policy Studies Journal* 2, no. 1 (1973): 19–25.

¹¹⁴ Ibid., 20.

¹¹⁵ Ibid., 21.

Subsequent research points to groupthink as a contributing factor for the two NASA shuttle explosions, the Iraq invasion in 2003, and the financial collapse of AIG, Fannie Mae, Freddie Mac, and Lehman Brothers.¹¹⁶ This suggests that the pervasive affects of groupthink impact experts and nonexperts alike.

The failure of the prognosticative powers of both economic and homeland security experts suggests a marked similarity to the behaviors of efficient markets, where future market prices defy even expert predictions. In this instance prices of stocks in the homeland security market fully reflect all available information. Political analysis of share price fundamentals is already taken into consideration in the price, thus making expert predictions as to the direction of the market no more than educated, or at times, wild guesses. This casts further doubt on the value of national and homeland security experts and should give us pause to question our confidence and reliance in expert opinion and predictions, whether in the finance or the homeland security realm. Successful investing often requires diversification, ignoring stock tips, and at times contrarian thinking.

2. On Black Swans

Biases also play a major role in interfering with our ability to interpret and understand our actual exposure and susceptibility to Black Swan events.¹¹⁷ A Black Swan is a low probability, high consequence event that Taleb states has three attributes: “First, it is an outlier, as it lies outside the realm of regular expectations, because nothing in the past can convincingly point to its possibility. Second, it carries an extreme impact. Third, in spite of its outlier status, human nature makes us concoct explanations for its occurrence after the fact, making it explainable and predictable.”¹¹⁸

Taleb’s definition suggests that Black Swans are in fact *relative* in the eyes of the beholder. A Black Swan by its nature implies surprise as it emerges beyond the realm of

¹¹⁶ Roland Bénabou, “Groupthink: Collective Delusions in Organizations and Markets,” *Review of Economic Studies* 80, no. 2 (Apr 2013): 429–462.

¹¹⁷ Kahneman, *Thinking, Fast and Slow*, 278–288.

¹¹⁸ Taleb, *The Black Swan*, xvii–xviii.

our regular expectations. However, what is unexpected to one person may in fact be predictable to a certain degree by others. Sometimes known as “Gray Swans,” these are rare, high consequence events but somewhat calculable. Earthquakes, fires, wars, and the next stock market crash technically make up Gray Swans. However, even Gray Swans can surprise us. Forgetting that something is random or anticipating a particular Black Swan, what Taleb calls “tunneling,” can leave you ignorant to the facts of the realm of other possibilities.¹¹⁹

Kahneman and Tversky discuss prospect theory to show how our biases affect our decisions when faced with risk of varying probabilities. This theory shows that rare events (low probability) are underweighted and often ignored when we lack experience from the event or when we fail to imagine it.¹²⁰ Discussing the risk of rare events, Taleb notes that “we tend to underestimate both the probabilities and the damage.”¹²¹ He describes how we are becoming more globally interconnected, and thus are more vulnerable to setbacks and Black Swans, yet we continue to build riskier systems with greater risks of failure. Alternatively, prospect theory suggests that recent rare events are overestimated and thus overweighted because of confirmatory bias of memory. Kahneman uses examples such as playing the lottery or terrorism to show how the vividness of memory can make “the actual probability inconsequential; only possibility matters.”¹²²

Another principle of prospect theory is loss aversion. When we make decisions, we are often faced with the prospect of losses and gains. Loss aversion describes the larger emotional impact that losses have over gains. “Losses loom larger than gains,” notes Kahneman.¹²³ Though a choice may have a positive expected value, loss aversion causes us to shun the possibility of loss at the risk of missing out on potentially positive outcomes. As humans, we are “guided by the immediate emotional impact of gains and

¹¹⁹ Ibid., 138–150.

¹²⁰ Kahneman and Tversky, “Prospect Theory,” 263–291.

¹²¹ Nassim Taleb, “What’s Next for Nuclear Power?,” *Fortune*, Apr 11, 2011, 102.

¹²² Kahneman, *Thinking, Fast and Slow*, 323.

¹²³ Ibid., 282.

losses,” explains Kahneman.¹²⁴ The prospect of losses is perceived as inherently more risky than the prospect of gains, despite any positive expected value. Here, Slovic’s *risk as feelings* is especially relevant, as our feelings guide our perception of risk, and thus our decisions.¹²⁵ Related to loss aversion, emotional framing impacts how we view losses and costs. Kahneman explains that when compared against each other, “*losses* evokes stronger negative feelings than *costs*.”¹²⁶

Loss aversion is especially relevant in both the stock market and homeland security. When stocks undergo an unexpected drop, the emotional toil of sudden losses can drive investors to sell, even at a loss. Selling at a loss is the cost of preventing further losses and perhaps why it is so hard to buy low and sell high. Similarly, the concept of loss aversion and risk as feelings make it easier to understand the public’s emotional reactions following a terrorist attack. People fear the uncertainty and possibility of future losses from terrorism; Sandman might argue that this is manifested as outrage (risk = hazard + outrage). As losses loom larger than costs, people will be willing to pay extra rather than face the potential for more losses.

Our susceptibility to Black Swan type events are also impacted by our hindsight and overconfidence biases. Defined as “an unjustified increase in the perceived probability of an event due to outcome knowledge,” hindsight bias plays a considerable factor in understanding the past as a linear extension of the future.¹²⁷ Fischhoff first described hindsight bias in 1975, as “creeping determinism” to describe our tendency to view the past with less uncertainty than originally experienced. Fischhoff highlights how in the long run, unperceived creeping determinism “can seriously impair our ability to judge the past or learn from it.”¹²⁸ Economist Kenneth French explains that, “We’re all

¹²⁴ Ibid., 287.

¹²⁵ Slovic et al., “Risk as Feelings,” 311–322.

¹²⁶ Kahneman, *Thinking, Fast and Slow*, 364.

¹²⁷ Robert P. Agans and Leigh S. Shaffer, “The Hindsight Bias: The Role of the Availability Heuristic and Perceived Risk,” *Basic & Applied Social Psychology* 15, no. 4 (Dec 1994): 439–449.

¹²⁸ Baruch Fischhoff, “Hindsight is Not Equal to Foresight: The Effect of Outcome Knowledge on Judgment Under Uncertainty,” *Journal of Experimental Psychology: Human Perception and Performance* 1, no. 3 (1975): 311.

overconfident, and one of the sources of that is the simplicity of looking backwards.”¹²⁹ We all want to be part of a rising tide of increasing stock prices, gold prices, or house prices. Hindsight of increasing prices lends us a glimpse of where these prices might continue to go, and we want in. For instance, from 1989 to 2008 the stock market gained just over 8% a year, but the average investor earned less than 2% thanks to overconfidence and lousy timing.¹³⁰

Behavioral science lends clues to help understand our inability to buy low and sell high. As Kahneman notes, “hindsight bias has pernicious effects on the evaluation of decision makers.”¹³¹ The context, risk, and uncertainty of the situation are often lost to a clear outcome bias, where decisions are based not on the *quality of the process* but on *pure outcome* alone. In financial terms, this is apparent in the annual return on portfolios or funds. Emphasis is placed not on the process or investment strategy, but rather on the bottom-line. Kahneman suggests that there is a direct correlation to the consequence of the outcome and the level of hindsight bias. He illustrates the events and intelligence leading up to 9/11 as an example of our beliefs that officials were “negligent or blind” to the ensuing events to come. On July 10, 2001, CIA information that al-Qaeda might be planning an attack on the U.S. was relayed to the National Security Advisor, Condoleezza Rice rather than the President. As the facts later emerged, Kahneman notes that, “Ben Bradlee, the legendary executive editor of the Washington Post, declared, ‘It seems to me elementary that if you’ve got the story that’s going to dominate history you might as well go right to the president.’ But on July 10, no one knew—or could have known—that this tidbit of intelligence would turn out to dominate history.”¹³²

This is not to discredit that leadership should be held accountable for the outcome of decisions. In fact, decision makers expect this and often result to more bureaucratic solutions and procedures, or even consulting experts to justify their decisions. Kahneman notes that this can lead to an extreme reluctance to take risks. Alternatively, hindsight and

¹²⁹ Reginer, “Can You Outsmart the Market?,” 58.

¹³⁰ Ibid.

¹³¹ Kahneman, *Thinking, Fast and Slow*, 203.

¹³² Ibid., 204

outcome bias can also bring unwarranted rewards to irresponsible risk seekers. “Leaders who have been lucky are never punished for having taken too much risk. A few lucky gambles can crown a reckless leader with a halo of prescience and boldness.”¹³³ However, even a savvy financial advisor or fund manager knows that they must continually be anointed with luck to best the market year after year.

While Black Swans can be both good and bad, we often fail to learn from them or take advantage of any opportunities they might present. For example, our tendency to use past events to judge today's and tomorrow's events can often times make us overconfident when evaluating and judging risk and uncertainty. Shiller discusses how overconfidence bias stems from biased self-attribution, first identified by Daryl Bern. When our actions are confirmed by good events, we usually attribute this to our skills. When something negative occurs, we are quick to attribute bad luck.¹³⁴

Taleb highlights how overconfidence in our decisions and abilities, and a lack of evidence of negative events, gives us a false sense of security. “That we got here by accident does not mean we should continue to take the same risks,” declares Taleb.¹³⁵ This is what Taleb describes as thinking like a turkey. Just because you are well fed, fat and happy, does not mean that Thanksgiving is not around the corner. Investors can be guilty of being the turkey as they seek to invest in known, retrospective winners and shun the losers. Additionally, financial firms are eager to highlight their past successes, while making sure the fine print, “past performance does not necessarily predict future results,” is as small as possible.¹³⁶

Whereas investors might look to winning stocks as indications of future performance, in the homeland security realm, a lack of terrorist attacks sometimes implies evidence of a successful antiterrorism strategy. Governments might make decisions based on what has or has not happened and anticipate a similar trend in the

¹³³ Ibid., 204

¹³⁴ Robert Shiller, “From Efficient Markets Theory to Behavioral Finance,” *Journal of Economic Perspectives* 17, no. 1 (Winter 2003): 83–104.

¹³⁵ Taleb, *The Black Swan*, 116.

¹³⁶ U.S. Securities and Exchange Commission, “Mutual Funds, Past Performance,” <http://www.sec.gov/answers/mperf.htm>.

future. Lacking a significant homeland security event, hindsight and outcome bias can lead to complacency. This prevents imagination and the necessary evolution of the homeland security system to meet future threats. *Past performance does not indicate future returns*, both in a financial sense and a homeland security sense.

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IV. DISCUSSION

A. ANTIFRAGILITY – THE UPSIDE TO RISK

Warren Buffet's famous adage helps dictate his approach to risk and buying stocks, "Be fearful when others are greedy, and be greedy when others are fearful...bad news is an investor's best friend. It lets you buy a slice of America's future at a marked-down price."¹³⁷ In financial terms, this is the epitome of buying low and selling high. Buffet's advice, penned a mere six months before the market hit bottom during the 2008 financial crisis, helped explain why he was actively buying stocks and acquiring companies worth tens of billions of dollars. From October 16, 2008, the day his article was published, to May 13, 2013, the S&P 500 index gained 108%. Buffet's advice suggests an alternate view to risk; the upside to risk by capitalizing on negative events. However, this approach to risk seems contrary to how many interpret risk and uncertainty.

What does Buffett's advice mean for homeland security? Bubbles and crashes in financial markets are also observed in homeland security. The events of 9/11, Hurricane Katrina, Super Storm Sandy, the Boston bombings, the near misses of Northwest Flight 253, and the bombing attempt on Times Square are examples of varying levels of volatility. Events such as these can shock the homeland security market. What is important is how homeland security investors plan to respond to these events and seek long-term opportunity in the midst of crisis.

Recalling Slovic's risk as feelings lends an understanding of why it is so hard for people to buy low and sell high. Feelings, through the affect heuristic, heavily influence one's risk perceptions, which in turn can influence one's decisions and judgments.¹³⁸ This suggests that when considering individual's feelings and biases, one often views and understands risk as something to be avoided and mitigated.

¹³⁷ Warren Buffett, "Buy American. I Am," *New York Times*, Oct 16, 2008, http://www.nytimes.com/2008/10/17/opinion/17buffett.html?_r=0.

¹³⁸ Slovic et al., "Risk as Feelings," 311–322.

However, this perception can prevent people from planning to benefit from the volatility and potential upside that is inherent in risk and uncertainty. Often, the potential for greatest opportunities emerge during times when fear and risk seem to dominate the conscience, as seen during the nadir of the recent financial crisis in 2009. This suggests avoiding risk and volatility, and not preparing for them can actually be harmful. However, this does not mean that we should be looking forward to the next financial crisis, hurricane, or terrorist event. These inevitably will come. Benefiting from volatility means being able to plan to benefit from the crisis. It means never letting a serious crisis go to waste.

Nevertheless, accepting risk, volatility, and uncertainty can be difficult, especially in political contexts or when one has been conditioned to rely on the fragile systems all around. Rather than shunning risk, how can one leverage the knowledge of biases to benefit from risk exposure and volatility? This suggests the need for a strategy that accounts for biases and seeks benefits from volatility and risk exposure.

Taleb describes a unique way of thinking to benefit from Black Swans. He argues that Black Swans arise from fragile systems; those that can break when subject to stress and volatility. Whether the system concerns, health, finance or politics, critical elements make the system fragile. Taleb argues that to counter the fragile systems of this world we must seek to build and foster systems that are *antifragile*. These systems benefit from volatility by having more to gain than lose over the long term when subject to stress.¹³⁹

More than being robust or resilient, which resist or absorb volatility and return to their normal states, things that are antifragile benefit from volatility. They have more upside than downside and adapt to become better than they were. Antifragile things are inherently asynchronously positive when subject to volatility or stress. Antifragility is a strategy for strategies.¹⁴⁰

¹³⁹ Nassim Taleb, *Antifragile*, 301–335.

¹⁴⁰ Ibid.

But how do we build antifragile systems? Across the homeland security and financial realms, three key elements stand out which can enable the implementation of an antifragile system: *via negativa*, *optionality*, and *leveraging bias knowledge*.

1. Via Negativa

According to Taleb, *via negativa* or the negative way, consists of removing the fragile elements of our current systems. “We know a lot more about what is wrong than what is right...negative knowledge (what is wrong, what does not work right) is more robust to error than positive knowledge (what is right, what works).”¹⁴¹ Taleb uses happiness as an example that is best dealt with as a negative concept. Avoiding unhappiness is a vastly different concept than pursuing happiness and it is a far easier concept to grasp. “Each of us certainly knows not only what makes us unhappy but what to do about it,” describes Taleb.¹⁴² In a similar fashion, “it is far easier to figure out if something is fragile than to predict the occurrence of an event that may harm it,” this is Taleb’s solution to the Black Swan problem.¹⁴³

Via negativa suggests that individuals and organizations should invest more time in identifying those things and processes that do not work correctly, rather than focusing on improving or protecting what works. *Via negativa* is immune to the sway of predictions and forecasts; it focuses on removing those elements which create fragility in things and require ever more complexity to work. In finance, John Bogle, founder of Vanguard and inventor of the index fund, is famous for decrying the erosion impact that investment expenses can have on financial investment returns. Bogle argues that people fail to account for the “tyranny of compounding costs,” in which Wall Street gets as much as 80 percent of returns.¹⁴⁴ Expense ratios, transaction costs, and advisor fees are some of the most common investment costs that can quickly add up.

¹⁴¹ Taleb, *Antifragile: Things that Gain from Disorder*, Kindle edition, 5362.

¹⁴² *Ibid.*, 6410.

¹⁴³ *Ibid.*, 354.

¹⁴⁴ John Bogle, “Frontline Interview,” Feb 7, 2006, <http://www.pbs.org/wgbh/pages/frontline/retirement/interviews/bogle.html#2>.

In the homeland security realm, the tyranny of compounding costs is also relevant. Mueller and Stewart note that DHS has spent well over one trillion dollars in the decade following 9/11; costs that they argue are not commensurate with the risks. They note that to justify DHS, the common question has been, “Are we safer?” Yet, this seems to be a substitute question for the much harder one, “Are the gains in security worth the costs?”¹⁴⁵ However, the price for safety and security extends beyond purely monetary means.

Admiral William Crowe noted that, “The real danger lies not with what the terrorists can do to us, but what we can do to ourselves when we are spooked.”¹⁴⁶ Echoing this sentiment, author William Arkin advocates the view that the national security establishment that defends us from terror is actually undermining the liberties that make the very essence of this country. He argues that the threat of terrorism has generated an “elevation of common defense above public welfare.”¹⁴⁷ This suggests that the monetary costs and eroded liberties dominate the homeland security portfolio and is past due for adjusting and rebalancing. Instead, a *via negativa* approach would align investment activities and costs with expected returns.

To visualize *via negativa* for homeland security and finance, consider a tree that is antifragile because of regular pruning (see Figure 5). Though pruning subjects the tree to stress and volatility, it shapes the future growth of the tree, enabling it to be healthier and stronger. Trimming removes those things that negatively impact the growth and vitality, e.g., dead branches, sappers, etc. Pruning prepares the tree to withstand the storms and droughts of tomorrow. Much like a tree, healthy financial portfolios should be “pruned” or rebalanced at least yearly. This includes selling winning stocks while buying oversold or distressed stocks. Rebalancing allows an investor to take the time to consider their personal situation, investing costs and goals, and the current state of the market.

¹⁴⁵ Mueller, John and Mark Stewart, “Balancing the Risks, Benefits, and Costs of Homeland Security,” *Homeland Security Affairs* 7 (August, 2011): 1.

¹⁴⁶ Stephen Flynn, *The Edge of Disaster: Rebuilding a Resilient Nation* (New York: Random House, Feb, 2007), 92–93, Kindle edition.

¹⁴⁷ William Arkin, *American Coup: How A Terrified Government is Destroying the Constitution* (New York: Little Brown and Company, Sept 2013), 4.



Figure 5. A homeland security tree. Trees grow antifragile through regular trimming and pruning. Homeland security or a financial portfolio, considered as a tree, also grows antifragile through regular trimming and rebalancing. Word cloud illustration of www.dhs.gov, created at Tagxedo.com.

Likewise, a homeland security tree might also grow stronger, healthier and more antifragile when subject to the volatility and stress of regular pruning and trimming. This means that Congress and DHS should evaluate oversight and accountability, and continuously assess security activities, adjusting or eliminating activities whose costs are incommensurate with the expected gains. A clear example of via negativa is reform of DHS Congressional oversight.

Despite recommendations by the 9/11 Commission for oversight reform, DHS currently reports to over 100 committees and subcommittees in Congress. This fractured system of oversight makes it difficult to craft substantive legislation that establishes homeland security priorities and guides DHS and other stakeholders. A recent bipartisan taskforce report on oversight highlights how the current complicated oversight is wasteful and negatively impacts how DHS can respond to major vulnerabilities and threats.

Consistent with the 9/11 Commission's recommendation, this task force calls for Congressional oversight consisting of one committee in the House and one in the Senate.¹⁴⁸ Former Governor Thomas Kean and former Representative Lee Hamilton, both co-chairmen of the 9/11 Commission and members of the taskforce, argue that "the American people will be safer if Congress takes a clearer, less complicated approach to its supervision of national security."¹⁴⁹

Other examples of pruning or *via negativa* in homeland security include combining or eliminating redundant agency activities, such as those of the Coast Guard and Customs and Border Protection's Office of Air and Marine. To address costs, DHS could mandate more cost-share policies that allocate security costs to those users who benefit the most, i.e, the 9/11 security fee charged to airplane passengers and prioritizing and reducing the cost-share of the Federal Emergency Management Agency (FEMA) disaster assistance.

To protect against a bubble or an irrational market, DHS should regularly question the market and the experts by making bets against market sentiment and routinely revisit the level and understanding of risk and challenge assumptions. However, mission creep can make this a difficult undertaking. Clay Shirky famously noted that sometimes, "Institutions will try to preserve the problem to which they are the solution."¹⁵⁰ Known as The Shirky Principle, this relates to the idea that organizations can become so obsessed with a strategy that they end up becoming part of the problem that they are trying to solve. Just as Wall Street makes its living by perpetuating the idea that you must invest your money with the pros to make a return on your investments; DHS may be perpetuating the terrorism problem by over-selling the threat of terrorism to begin with. Citing Ian Lustick, Muller and Stewart echo this point, noting that the

¹⁴⁸ Annenberg Foundation Trust at Sunnylands and Aspen Institute Justice & Society Program, "Task Force Report on Streamlining and Consolidating Congressional Oversight of the U.S. Department of Homeland Security," Sep 2013, <http://sunnylands.org/files/posts/451/sunnylands.pdf>.

¹⁴⁹ Thomas Keane and Lee Hamilton, "Homeland Confusion," *New York Times*, Sep 12, 2013. <http://www.nytimes.com/2013/09/11/opinion/homeland-confusion.html>.

¹⁵⁰ Barry Popik, "Speech Given by Clay Shirky at South by Southwest Conference," March 2010, <http://www.barrypopik.com/>.

government “can never make enough progress toward ‘protecting America’ to reassure Americans against the fears it is helping to stoke.”¹⁵¹

Unless the terrorism problem continues unabated for decades to come, at some point DHS may likely have to redefine itself and what homeland security means to the public. As homeland security is ultimately about “effectively managing risks to the Nation’s security,” DHS may define its existence by how well it can continue to generate fear from potential risks, regardless of the potential costs.¹⁵² As evidence points to costs being disproportionate with the risks, this suggests that we should look to ways to reduce the cost of investing with DHS or seek a new investment manager all together. This via negativa approach may require outside innovation and realignment, bearing tough questions, such as: Is DHS necessary? What does DHS look like without terrorism? Without terrorism—what justifies the Department and its costs to the freedoms of the very citizens it has been formed to protect? What costs are we willing to bear for a small reduction in risk that is already low? These and similar questions should seek to identify and ultimately remove elements of DHS which tend to fragilize things and create the need for ever more complexity to function.

2. Optionality

In a financial sense, options are a contract sold by one party to another, where the buyer has the right, but not the obligation to buy or sell a security at an agreed upon price within a certain period of time.¹⁵³ Options are a means that allow investors to asymmetrically deal with uncertainty by limiting downside losses and capitalizing on gains. They can be speculative in nature or can act as insurance by transferring risk from one party to a counterparty. Options also enable antifragility through seeking opportunity in volatility. Thinking in terms of optionality lends us insight in how to benefit from risk, volatility, and uncertainty.

¹⁵¹ Mueller and Stewart, “Costs of Homeland Security,” 16.

¹⁵² Department of Homeland Security, *Risk Management Fundamentals*, 7–8.

¹⁵³ *Investopedia Online*, s.v. “option,” accessed 24 Nov 2013, <http://www.investopedia.com/terms/o/option.asp>.

The origin of the option goes back thousands of years. First reported by Aristotle in his *Politics*, he describes the successful trading by a Greek philosopher named Thales in approximately 600 BC. Though it was still winter, Thales, using his skills in astrology, came to believe that there would be a bountiful harvest of olives in the coming summer. More olives would require more olive oil presses. Thales purchased the right or option to use all oil presses in two cities at a predetermined price. As Aristotle describes, Thales gave some earnest money for “all the oil works that were in Miletus and Chios, which he hired at a low price...When the season came for making oil, many persons wanting them, he all at once let them upon what terms he pleased.”¹⁵⁴

In this case, the price of olives did increase and Thales rented the olive presses on financial terms of his choosing. He limited his downside loss (cost of the option contract) while becoming exposed to the potential of much larger gains (upside). By risking his earnest money (the price of the option contract) for the potential gain of higher rent prices for oil presses, Thales was making an asymmetric bet on the value of olives. This “asymmetric bet on prices,” Shiller notes, “is the essence of an option.”¹⁵⁵

Using stocks as an example, investors sometimes hedge against the uncertainty of a sudden fall in stock price by buying the option to sell a stock (buying a “put”) at a predetermined price within a defined period of time. Options can also be used to speculate or bet on the direction of a stock’s price.¹⁵⁶ Like Thales, if you believe the stock is going up over a certain period of time, you might buy a call option, giving you the right to buy a stock at a predetermined price. When the stock exceeds this price, the option is profitable.

Outside of finance, thinking in terms of options enables acceptance of uncertainty and volatility, and aids in the ability to spot opportunities. “An option,” according to

¹⁵⁴ Aristotle, *Politics: A Treatise on Government*, trans. William Ellis, Kindle edition (New York: E.P. Dutton & Co., 2013), 528–531.

¹⁵⁵ Shiller, *Finance and the Good Society*, 1990–91.

¹⁵⁶ The price of an option contract is a derivative of the price of the underlying stock, the agreed execution price (strike price), and time (the length of the contract option). Just as with other markets with buyers and sellers, option writers and option buyers reflect different views on the performance outlook of a particular stock; one party is betting or hedging on a fall in the stock price, while the other is seeking a rise in price.

Taleb, “is what makes you antifragile and allows you to benefit from the positive side of uncertainty, without a corresponding serious harm from the negative side.”¹⁵⁷ Optionality, or thinking in terms of options, allows us to view risk as something that is necessary.

However, when we fail to see the benefits of optionality, opportunities arising from risk, volatility, and uncertainty can often be lost. In the homeland security realm, the federal government has been using options as a means of risk transfer and insuring state and local governments against natural disasters. However, the government has been doing so at an unsustainable market discount. FEMA, through the Robert T. Stafford Disaster Relief and Emergency Assistance Act, has been selling options in disaster aid and assistance to the states at an unusually high market discount. Under this Act, the federal government can contribute up to 75% of a declared disaster.¹⁵⁸ However, in subsequent appropriations this amount is often exceeded, up to 90%.¹⁵⁹

Highlighting the reliance on FEMA, the average number of disaster declarations by Presidential Administrations has steadily increased from 28 under President Reagan to 141 under President Obama.¹⁶⁰ When it comes to disaster recovery, states are looking first to the federal government. This excessive homogeneity concerning disaster recovery has a negative impact on local disaster preparedness. Reminiscent of Hardin’s *Tragedy of the Commons*, states are buying disaster recovery options at massive discounts from the federal government. These options act as massive subsidies for disaster and recovery insurance that disincentivize attempts to build long-term preventative measures. This also limits the options available for the federal government to respond to larger scale disasters. Recall that Hardin’s approach to this problem was not to harden or grow the commons

¹⁵⁷ Taleb, *Antifragile*, Kindle edition 3111–3113.

¹⁵⁸ *Robert T. Stafford Disaster Relief and Emergency Assistance Act*, 42 U.S.C. § 5170 (2010).

¹⁵⁹ *Disaster Assistance*, 44 C.F.R. § 206.47 (2010).

¹⁶⁰ Heritage Foundation, “FEMA Declarations by Year and Presidential Administrations,” Oct 31, 2012, <http://www.heritage.org/multimedia/infographic/2012/10/fema-declarations-by-year-and-by-presidential-administration>; Federal Emergency Management Agency, “Disaster Declarations,” <http://www.fema.gov/disasters>.

but to not maintain it.¹⁶¹ Rather than continue to keep options limited by reinforcing the commons, FEMA reform advocates argue that Congress should reduce FEMA's cost-share provision for all disaster declarations to no more than 25%. This would ensure FEMA is better prepared and equipped to handle large scale national level disasters while reducing the systemic reliance of states on federal disaster assistance funding.¹⁶²

Timothy Luehrman argues for using options as a means to craft and execute strategy. He discusses how options in strategic thinking “incorporate both the uncertainty inherent in business and the active decision making required for strategy to succeed.”¹⁶³ He uses gardening as a metaphor for cultivating a portfolio of options in a strategy to yield the most bountiful harvest. Here the strategist is the gardener and must price the risks of decisions taken now versus the potential of deferred gains in the future. Everything in between is presented as options, which the gardener must appropriately price and incorporate into their strategy. Just as master gardeners have years of experience, success in this endeavor often takes time.

“How does one become a good gardener? Practice. Practice,” states Luehrman.¹⁶⁴ This is a simple yet important point. Through practice or trial and error, optionality is cultivated, discovering and exploiting new options that can yield outsized benefits with minimal downside. Supporting this point, Taleb argues that “any trial and error can be seen as the expression of an option, so long as one is capable of identifying a favorable result and exploiting it.”¹⁶⁵

However, trial and error, and thus cultivating optionality, is often limited because of an innate fear of failure. Rita McGrath highlights the importance of using an options paradigm for discovering opportunities at the risk of failure, especially as it applies for

¹⁶¹ Hardin, *The Tragedy of the Commons*, 1243–1248.

¹⁶² Heritage Foundation, “FEMA Reform and Disaster Response: Heritage Foundation Recommendations,” Sep 8, 2011, <http://www.heritage.org/research/reports/2011/09/fema-reform-and-disaster-response-heritage-foundation-recommendations>.

¹⁶³ Timothy A. Luehrman, “Strategy as a Portfolio of Real Options,” *Harvard Business Review* 76, no. 5 (Sep 1998): 89.

¹⁶⁴ *Ibid.*, 99.

¹⁶⁵ Taleb, *Antifragile*, Kindle edition 3277–3278.

entrepreneurship. While entrepreneurship, through trial and error, can unleash “gales of creative destruction,” embracing it also implies accepting the uncertainties, volatility, and risk, which are often manifest in failure. “Enthusiasm for risk taking in the entrepreneurial process wanes considerably at the prospect of failure,” notes McGrath.¹⁶⁶

Unlike in finance, in reality the best options are those that sometimes do not cost anything; one simply has to have the commonsense to exploit a favorable option when it presents itself. While options in finance are specifically identified and can be expensive to purchase, options in other domains can be quite inexpensive. Fear of failure and uncertainty can often times inhibit us from exploiting favorable options when we see them; in other cases we simply are not open to ideas of potentially new opportunities outside of our familiarity. “Because of the domain dependence of our minds, we do not recognize [options] in other places, where these options tend to remain underpriced or not priced at all,” declares Taleb.¹⁶⁷

Options are a means that allow investors to asymmetrically deal with uncertainty by limiting downside losses and capitalizing on gains. Options also enable antifragility through seeking opportunity in volatility, uncertainty, and risk. However, these same elements also connote prospects of failure, and the fear of failure is a roadblock to discovering and exploiting options. When it comes to the fear of failure, our human biases certainly play a part. Understanding the role that our biases have on how we make decisions subject to uncertainty and risk may help to dispel or limit our fear of failure.

3. Leveraging Bias Knowledge

Antifragility thrives in the presence of volatility. One means to promote acceptance of volatility in a dynamic system would be to leverage the knowledge of how our biases impact our risk perception and judgments.

Our loss aversion bias noted by Kahneman’s and Tversky’s prospect theory, suggests that we are more upset by losses than we are by equivalent gains and will go

¹⁶⁶ Rita McGrath, “Falling Forward: Real Options Reasoning and Entrepreneurial Failure,” *Academy of Management Review* 24, no. 1 (Jan 1999): 13.

¹⁶⁷ Taleb, *Antifragile*, Kindle edition 3295–3298.

through great risk, often to our own detriment, for the possibility of avoiding any losses at all.¹⁶⁸ This indicates that when we recognize losses we are really recognizing our own failures, which we can often be loath to do. In finance, Shiller describes how these tendencies can be seen by investor's unwillingness to admit their failed investment strategies through their reluctance to sell losing stocks.¹⁶⁹ Understanding how the dynamics of loss-aversion, especially in the context of uncertainty, suggests that we should instead think in terms of options. This means viewing potential losses as costs ahead of time, thus mitigating the fear of failure. This should enable more careful consideration of what costs we are willing to bear ahead of time, while taking advantage of the potential for outsized returns over the long run.

We should also remain aware of the deleterious impacts of other biases, such as confidence bias, cognitive dissonance, and groupthink, which tend to erode our ability to recognize losses and enable our fear of failure. Additionally, affect heuristics influenced by availability, probability neglect, and our own reference points and hindsight guide our perceptions of risk.¹⁷⁰ Failure to recognize the influence that these biases have on our risk perceptions and decisions reduces optionality and the ability to asymmetrically deal with uncertainty. Recognition of how our biases can both harm and benefit us is key to developing an antifragile strategy that can thrive in the presence of risk and uncertainty.

In a financial sense, this implies optionality through multiple parallel paths. These include diversifying portfolios and using consistent broad framed strategies, such as dollar cost averaging, establishing automatic savings vehicles and maintaining a sufficient capital reserve to take advantage of market corrections. Opportunity costs are realized when portfolios earn less than the average aggregate market return during upside cyclical or bull markets. However, when markets turn negative, losses are minimized while cultivating options (optionality) to employ excess capital reserves to buy during market corrections. For investing, this broad framed approach seeks to remove the

¹⁶⁸ Kahneman, *Thinking, Fast and Slow*, 282–308.

¹⁶⁹ Shiller, “Efficient Markets to Behavioral Finance,” 83–104.

¹⁷⁰ Kahneman, *Thinking, Fast and Slow*, 278–340.

negative impacts (via negativa) that our biases can have on investment returns by establishing a methodological approach to investing.

In the homeland security and national security realm, the Defense Advanced Research Projects Agency (DARPA) is a leading example of a government agency that is antifragile. DARPA's success comes from its use of eliminating fear of failure by incorporating failure into the organization enterprise (via negativa), establishing multiple parallel paths for projects with defined goals (i.e., cultivating optionality) and leveraging bias knowledge to work to DARPA's advantage. Originally created in 1958 in response to the shock of the Soviet Union's launch of the world's first satellite, Sputnik, the nation established DARPA with the mission of "*preventing* technological surprise from adversely affecting our country while *creating* surprises for U.S. adversaries."¹⁷¹ While famously noted for revolutionary inventions and projects such as the Internet, GPS, and stealth technology, 85–90% of DARPA projects fail.¹⁷² Despite this inordinate failure rate, the impacts of DARPA's successes have been outsized, vastly paying for its budget many times over. This represents DARPA's antifragility; having more to gain than lose over the long term (i.e., asynchronous positive affects).

DARPA is a risk-seeking agency and is not constrained by risky projects that ultimately fail. Being antifragile, risk and volatility are necessary components to prevent and create technological surprise and deliver outsized successes. By challenging the status quo and thinking outside of and beyond the prevailing perspectives, DARPA creates a culture not constrained by failure.

DARPA's noteworthy successes and failures stem from developing a culture that removes the fear of failure, no matter how remote the chances of success or how risky the project. "When you remove the fear of failure, impossible things suddenly become

¹⁷¹ Defense Advanced Research Projects Agency, "DARPA Framework 2013- Driving Technological Surprise: DARPA's Mission in a Changing World," Apr 2013, <http://www.darpa.mil/WorkArea/DownloadAsset.aspx?id=2147486475.pdf>.

¹⁷² Charles Piller, "Army of Extreme Thinkers," *Los Angeles Times*, August 14, 2003, <http://articles.latimes.com/2003/aug/14/science/sci-darpa14>.

possible,” noted former DARPA director Regina Dugan. “I’m not encouraging failure. I’m discouraging fear of failure.”¹⁷³

Prospect theory is relevant to DARPA’s culture, where imagination and vividness of memory can make “the actual probability of success inconsequential; only possibility matters.”¹⁷⁴ In DARPA’s case, it is the *possibility* that matters. Leveraging and fostering possibility through human imagination and creativity, DARPA is in effect trying to force the discovery and creation of positive and negative Black Swans, what they call off-scale impact. As noted by Kahneman, emotional framing of loss aversion suggests that the public sees DARPA’s failures as *costs* rather than losses. This enables a culture at DARPA which is in fact risk seeking and allows public acceptance of the *costs* of a 90% failure rate in return for the richly oversized 10% successes.

Enabling outsized successes in the face of recurring failure is DARPA’s culture. As DARPA itself notes in its 2013 Framework report, “The most important ingredient in keeping DARPA healthy and robust [is] our culture. The relentless drive for off-scale impact. The willingness to take risk in pursuit of that impact,” remains the quintessence of their continued success.¹⁷⁵ Additionally, because of these outsized successes and off-scale impact, hindsight bias suggests that DARPA will continue to have similar success in the future. In fact this hindsight bias creates a prestige, which continues to draw some of the most creative, and “brilliant minds to court failure for a chance at greatness.”¹⁷⁶

¹⁷³ Regina Duncan, “Regina Duncan - from Mach 20 Glider to Hummingbird Drone,” Filmed Mar 2012, TED video, 25:02, Posted Mar 2012, http://www.ted.com/talks/regina_dugan_from_mach_20_glider_to_humming_bird_drone.html.

¹⁷⁴ Kahneman, *Thinking, Fast and Slow*, 323.

¹⁷⁵ Defense Advanced Research Projects Agency, “DARPA Framework 2013,” 16.

¹⁷⁶ Piller, “Army of Extreme Thinkers.”

V. CONCLUSIONS AND RECOMMENDATIONS

“Humpty Dumpty sat on a wall: Humpty Dumpty had a great fall.
All the Department’s horses and all the Department’s men,
Couldn’t put Humpty Dumpty back together again.”¹⁷⁷

This thesis begins by eavesdropping on the conversation between Alice and Humpty Dumpty. As a metaphor, it can be instructive to consider their conversation concerning the meaning of homeland security, perhaps in a Wonderland setting (see Figure 6):

“Don’t you think you’d be safer on the ground? That wall is so very narrow!” exclaimed Alice.

“What tremendously easy riddles you ask!” Humpty Dumpty growled. “Of course I don’t think so! Why, if ever I did fall off— which there’s no chance of—but if I did...if I did fall,” he went on, “The Department of Homeland Security has promised me — to — to —”

“To send all of his horses and all of his men,” Alice interrupted. “But tell me,” asked Alice, “what do you mean by homeland security? What or who is homeland security?”

“When *I* say homeland security,” Humpty Dumpty said in a rather scornful voice, “it means just what I choose it to mean—neither more nor less!”

“The question is,” said Alice, “whether you *can* make homeland security mean so many different things.”

“Not so,” said Humpty-Dumpty, “the question is which is to be the master. That’s all.”¹⁷⁸

¹⁷⁷ Changes to the original rhyme are mine.

¹⁷⁸ Changes to original dialogue of Carroll’s *Through the Looking Glass* (page 980) are mine.



Figure 6. Humpty Dumpty in the midst of a discussion with Alice on the meaning of homeland security (adapted from illustration by John Tenniel from Carroll's *Through the Looking Glass*.)

As Humpty Dumpty alludes, homeland security can mean different things to different people. However, varying definitions of homeland security can cause misalignment with budgets and homeland security strategies.¹⁷⁹ While the definition of homeland security continues to evolve, this thesis sets out to understand homeland security through the lens of risk and uncertainty. It looks across domains to financial markets to explore how humans interact and make decisions when surrounded by risk that is dynamic.

The usefulness of the financial market metaphor is that it allows one to conceptualize homeland security as an investor's financial portfolio that is subject to market volatility, market sentiment and mood, investing costs, and market bubbles and busts. What this teaches us is that the financial and homeland security domains share the common denominator of individual and market behavior that is profoundly affected by psychological biases, especially when confronted by complex risk and uncertainty.

Recognizing the impact that these biases have in shaping judgments, behaviors, and risk perceptions allows one to better understand homeland security. This results in identifying *antifragility* as a nontraditional risk management strategy for the homeland security domain that is less dependent on definitions. Antifragility is a strategy that can help leverage knowledge of biases and craft a portfolio that takes advantage of risk,

¹⁷⁹ Shawn Reese, *Defining Homeland Security*.

uncertainty, and volatility. Using financial markets as a metaphor helps to envision how antifragility applies to an investor's portfolio and by extension, what it means to be antifragile in homeland security.

Studying the financial domain requires understanding how investors allocate limited assets over time under conditions of certainty and uncertainty. To study the homeland security domain is to consider how individuals allocate limited resources on a rational or seemingly irrational prioritized risk basis to prevent or mitigate terrorist attacks within the United States. This requires reducing the vulnerability of the strategic components of American power, which includes the economy and its financial domain.¹⁸⁰ Financial markets have huge implications for the solvency of the nation and the general condition of the economy. Protecting the security and confidence of others in the nation's economy and financial systems is one of the key objectives of the homeland security domain.¹⁸¹

To understand homeland security as a stock market, it is important to understand how stock markets behave. In many instances, stock markets behave efficiently. In an efficient market, stock prices revolve around the continuous flow and interpretation of information/data where stock prices fully reflect all available information. Transactions in the market, seen as buying and selling, serve as a means of price discovery, where investors learn the value of whatever is being traded.¹⁸² As new information becomes available, the market quickly digests and adjusts prices accordingly.

Similarly, an efficient homeland security market implies that transactions between adversaries also serve as a means of price discovery. Advantages and exploitations from

¹⁸⁰ James Kurth cites economic power as the essential base for military and ideological power. See "Pillars of the American Century," <http://www.the-american-interest.com/article.cfm?piece=688>; ADM Michael Mullen has in multiple venues cited the national debt as the most significant threat to national security. See <http://www.cnn.com/2010/US/08/27/debt.security.mullen/>.

¹⁸¹ U.S. Department of Homeland Security, "Secretary of Homeland Security Janet Napolitano's 2nd Annual Address on the State of America's Homeland Security: Homeland Security and Economic Security," Department of Homeland Security, Jan 30, 2012. <http://www.dhs.gov/news/2012/01/30/secretary-homeland-security-janet-napolitanos-2nd-annual-address-state-america>.

¹⁸² Robert Shiller, *Finance and the Good Society*, Kindle edition (New York: Princeton University Press, 2012), 555.

either an adversary perspective (i.e., threats), or from a government perspective (i.e., countermeasures) are short lived, as each entity acts on the available information in the environment. Intelligence is analyzed to determine the potential threats, vulnerabilities, and consequences. Countermeasures are employed to areas of greatest risk, while the political process engages regulations and international regimes to mitigate risk. As information is discovered in the homeland security market, the price or value of the exchange between threats and countermeasures increases or decreases.

Alternatively, research from psychology and behavioral economics have shed new light on the nonefficient nature of financial markets. Biases, irrational behaviors, and feedback of the market participants themselves affect and are affected by valuation and the perception of risks. This helps to explain why many investors buy high and sell low, and why markets undergo bubbles and busts. Market complexity gives an idea of the inherent nature of things to move from a state of stability to instability, or from an efficient market to an inefficient one. This is the study of individual yet interconnected parts of a system that tend to move from a state of equilibrium to upheaval, as seen through bubbles, busts, and Black Swans.¹⁸³

In a similar fashion, bubbles and inefficient markets can also be seen from a homeland security system perspective. Nowhere is this more apparent than with terrorism. Inadequate and inappropriate countermeasures can occur for numerous reasons, including but not limited to complacency, fiscal reductions, and not understanding or underestimating the dynamic and agile nature of threats. Similar to an investment portfolio that is not diversified, not having the necessary countermeasures in place increases risk in the homeland security system and can lead to a vacuum bubble of *under-protection*.

Yet perhaps even more common in a post-9/11 environment, though sometimes inconspicuous, is a bubble of *over-protection*. This can entail massive use of costly resources and restrictive regulations that can limit individual freedoms in exchange for a

¹⁸³ Mark Buchanan, *Ubiquity: Why Catastrophes Happen* (New York: Three Rivers Press, 2001), 273; Ted Lewis, *Bak's Sand Pile* (Williams California: Agile Press, 2011), 46; Melanie Mitchell, *Complexity A Guided Tour*, Kindle edition (New York: Oxford University Press, 2009), 335.

promise of safety. Likewise, public outrage from terrorism and its political dimensions can demand homeland security leadership to react and employ numerous and often-costly antiterrorism activities, even if these actions cannot be proven effective.

This thesis cautions that in the current market, homeland security can easily fall victim to or may already be operating in a bubble of over-protection without sufficient regard to the cost-benefits. In financial markets, investment expenses and opportunity costs from an overly conservative portfolio can have debilitating affects on returns. Akin to an overly conservative portfolio, homeland security may be operating in a bubble of over-protection, where the monetary and personal liberty costs can be incommensurate with the expected end-states of safety and security.

Biases also play a major role in interfering with our ability to interpret and understand our actual exposure and susceptibility to market volatility and Black Swan events.¹⁸⁴ The events of 9/11, Hurricane Katrina, Super Storm Sandy, the Boston bombings, the near misses of Northwest Flight 253, and the bombing attempt on Times Square all represent varying levels of volatility. Events such as these can shock the homeland security market. These events show that even with sound investing strategies, a homeland security portfolio is still subject to the volatilities and uncertainty of the market. However, as Warren Buffett asserts, often the potential for greatest opportunities emerge during times when fear and risk seem to dominate the conscience, as seen during the nadir of the recent financial crisis in 2009. What is important is how homeland security investors plan to respond to these events and seek long-term opportunity in the midst of crisis.

Adopting a broad framed, antifragile strategy is key to dealing with and taking advantage of Black Swans, volatility, and uncertainty. More than being robust or resilient, which resist or absorb volatility and return to their normal states, strategies that are antifragile benefit from volatility, have more upside than downside, adapt and become

¹⁸⁴ D. Kahneman, *Thinking, Fast and Slow* (New York: Farrar, Straus and Giroux, 2011), 278–288.

better than they were. An antifragile strategy incorporates *via negativa*, *optionality*, and *leveraging knowledge of biases*.¹⁸⁵

To make something antifragile, individuals and organizations should invest more time in identifying those things and processes that are negative rather than focus on the positive. This is known as *via negativa*, or the negative way. What is known to be harmful is more robust to errors than what we know is good. Removing things that are negative can uncover hidden options that can better prepare people or organizations for uncertainty and market volatility. Options are a means that allow investors to asymmetrically deal with uncertainty by limiting downside losses and capitalizing on gains. Options also enable antifragility through seeking opportunity in volatility that is inherent in both the homeland and financial markets.¹⁸⁶

A clear example of antifragility through *via negativa* is reform of Congressional oversight of DHS. Despite recommendations by the 9/11 Commission, DHS currently reports to over 100 committees and subcommittees in Congress. This fractured system of oversight makes it difficult to craft substantive legislation that establishes homeland security priorities and guides DHS and other stakeholders. A recent bipartisan taskforce report on oversight highlights how the current complicated oversight is wasteful and negatively impacts how DHS can respond to major vulnerabilities and threats. Consistent with the 9/11 Commission's recommendation, this task force calls for Congressional oversight consisting of one committee in the House and one in the Senate.¹⁸⁷ Former Governor Thomas Kean and former Representative Lee Hamilton, both co-chairmen of the 9/11 Commission and members of the taskforce, argue that "the American people will be safer if Congress takes a clearer, less complicated approach to its supervision of national security."¹⁸⁸ Oversight reform should allow more transparency and direction for

¹⁸⁵ Nassim Taleb, *Antifragile*, 301–335.

¹⁸⁶ Ibid.

¹⁸⁷ Annenberg Foundation Trust at Sunnylands and Aspen Institute Justice & Society Program, "Task Force Report on Streamlining and Consolidating Congressional Oversight of the U.S. Department of Homeland Security," Sep 2013, <http://sunnylands.org/files/posts/451/sunnylands.pdf>.

¹⁸⁸ Thomas Keane and Lee Hamilton, "Homeland Confusion," *New York Times*, Sep 12, 2013. <http://www.nytimes.com/2013/09/11/opinion/homeland-confusion.html>.

how to allocate and appropriate scarce homeland security funding. Currently, approximately 50% of homeland security funding appropriations is *not* spent on DHS activities and missions.¹⁸⁹ Oversight reform should enable more options and prioritization of this funding to ensure that costs are being appropriately applied towards risks.

Other examples of antifragility through via negativity might mean adjusting or eliminating activities whose costs are disproportionate to the expected gains, including combining or eliminating redundant agency activities, i.e., Coast Guard and Customs and Border Protection maritime security activities. To address costs, DHS should mandate more cost-share policies that allocate security costs to those users who benefit the most, i.e, the 9/11 aviation security fee and FEMA disaster assistance. Table 1. illustrates how these and other examples of antifragility might be applied in homeland security.

¹⁸⁹ Shawn Reese, *Defining Homeland Security*, 7.

Example	Current State	Antifragility Applied	Future State
Congressional Oversight of DHS	- DHS reports to over 100 committees and subcommittees in Congress.	- Consolidate oversight into one Senate and one House oversight committee.	- Congress can better define homeland security priorities and craft impactful homeland security legislation
Maritime Security (Coast Guard)	- Coast Guard conducts costly security activities for certain facilities and vessels. Those who directly benefit the most from these activities do not share the cost.	- Implement cost sharing arrangements. - Prioritize and fund/cost share security activities to those that reduce or impact the greatest risk.	- Reflects the reality that security is a shared responsibility between the government, commerce, and the public. - Helps fund and prioritize security activities.
Maritime Security (Coast Guard and Custom's and Border Protection's Office of Air and Marine)	- Coast Guard and Air and Marine conduct similar maritime security activities	- Eliminate or combine activities - Combine agency resources	- Helps prioritize mission execution and reduce costs.
Disaster Assistance (FEMA)	- By law, FEMA can contribute up to 75% of the costs of a declared disaster. - States have little incentive to tackle disaster preparedness	- Reduce the cost share provision of FEMA to 25% or less - Reduce the number of Presidential Disaster declarations by creating a tiered criteria for federal disaster assistance.	- Local governments are less reliant on federal government and have incentive to build disaster mitigation measures. - Federal government has more options and funds to respond to larger scale disasters.
Airline Security (TSA)	- Employing airline security activities are costly - Some cost sharing measures, such as 9/11 passenger security fee, exist.	- Continue to evaluate whether the current cost share is enough - Consider reducing or eliminating those activities which are not supported through cost share	- Cost versus value comes into focus as those who directly benefit are forced to pay more for security measures.
Employee Evaluations (Coast Guard)	- Evaluation system costs exceed the benefit to the Coast Guard.	- Implement a one page evaluation that meets the needs of the system or service.	- Evaluations are more impactful while consuming less resources.

Table 1. How antifragility might be applied in homeland security

In an era of sequester and diminishing budgets, pruning is imperative. As evidence points to costs being disproportionate with the risks, this suggests that Congress and the Administration should seek ways to gain broader consensus to reduce the cost of investing with DHS or seek a new investment manager all together. For example, this via negativa approach may require outside innovation and realignment, bearing tough questions, such as: What costs are we willing to bear for a small reduction in risk that is already low? These and similar questions should seek to expose and ultimately remove

elements of DHS which tend to fragilize things and create a need for ever more complexity to function.

This thesis advances a nontraditional risk management strategy of antifragility for homeland security. This relies less on definitions of homeland security by managing the security environment bottom up rather than top down - removing the small negative risks to reduce the overall systemic risk. Antifragility *is not* a stock picking methodology. It will not suggest what stocks to buy tomorrow or what homeland security countermeasures need to be employed. Rather, it is a strategy for strategies; it creates options to better prepare for and take advantage of future market volatility. Antifragility in homeland security requires one to regularly challenge assumptions by making bets against market sentiment and routinely revisit the level and understanding of risk. In their particular sphere of influence, homeland security practitioners should ask, “What does not work well? What negatively impacts my work in homeland security? How can I have an impact to change these things?” The answers to these questions will likely produce a homeland security strategy that is more impactful, less reliant on definitions, and more robust to error than many activities and strategies employed today. This is what it means to be antifragile in homeland security.

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